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Italy: Business Innovation Center Operations Described

92MI0739 Milan LITO in Italian Sep 92 pp 19-22

[Article by Massimo Malaguti: "How To Develop Enterpreneurship: The Trieste BIC"]

[Text] The BIC [Business Innovation Center] in Trieste is a pilot enterprise creation center which places the facilities needed to set up a new enterprise at the disposal of aspiring entrepreneurs and provides them with the technical, financial, and organizational assistance necessary to develop new ideas and convalidate their economic viability.

From the beginning, the Trieste BIC, under the guidance of managing director Francesco Zacchigna has proven to be instrumental in the industrial policy of the Friuli-Venezia-Giulia region.

The success of this center, which was established by SPI (IRI group's the financial holding company for industrial development and promotion) and by the Friulia Regional holding company and other local bodies and associations, lies in the careful selection of company projects to be housed in the "incubator"—the well-equipped building which accomodates the manufacturing enterprises at the outset.

From the very beginning, the enterprises accomodated in the center were selected in relation to their possible insertion into the Friuli-Venezia-Giulia industrial sector, their ability to make use of the specialized services offered by scientific institutes in Trieste, and their inclination toward Eastern Europe.

This rigorous and realistic selection process enabled the Trieste BIC to overcome many of the difficulties encountered by other similar facilities in Europe (high failure rates among new enterprises, inability to penetrate the market, and projects that are never launched) and to add 23 new companies that currently employ more than 200 people to the local enterpreneurial scene.

BIC works primarily in the sectors of biotechnology, computer services to industries, and the new materials in line with the local economy and industries, and with technical and scientific institutes.

New companies were housed at BIC following a careful selection and evaluation of innovative ideas that focused on forging a strong connection between these new enterprises and the local business scene and its existing technical/scientific support systems. This involved a large number of projects (over 400 during the first two years of activity).

During its three years of operation, the mortality rate of companies within BIC has been zero.

These results are all the more impressive if we consider that almost all the new enterprises set up at BIC were first-time experiences for neo-entrepreneurs from a wide variety of backgrounds: young professionals, university professors, and new graduates (even some students). For these enterpreneurs the range of services offered by BIC provided them with just the opportunity they needed to develop an idea into a product.

The careful selection of the entrepreneur is another important element of BIC's strategy, which favors those who are professional and have the strength of character to "start up on their own."

Starting Up An Enterprise

The development of a business within BIC can be divided into three phases, and corresponds more or less to the company's first three years within the incubator.

During the first year, the product is "fine tuned" through the in-depth examination of its technological and functional characteristics and its production process, with particular attention being given to cost optimization and the utilization of new technologies.

Access to the excellent technical and scientific support that BIC is able to offer through its collaboration with the Trieste university institutes and the Research Area [Trieste science park], is seen to be a determining factor in the development of a company's competitiveness during this period.

During the second year, market research is normally carried out and the capacity and profitability of the business evaluated.

During the third year, the product's performance on the market is evaluated and the plans for the company to leave BIC and begin operating independently are drawn up.

These three years represent a period of general growth.

There are also cases where a business idea can become a concrete success over a much shorter period, because of its innovative nature and the way in which it can be realized.

To this end, particular importance is attached to the financing of these enterprises.

BIC's function in this case, is to act as a link between entrepreneurs and credit institutions as well as venture capital and warranty institutions.

SPI also makes a contribution to capital investments and financing.

Confirmation of Entrepreneurship—Some Success Stories

In BIC's short history, there are more than a few examples of innovative ideas that have been particularly well-received by the market following their development within BIC.

Vectorpharma International, one of the first enterprises to be housed in BIC, is a pharmaceutical company involved in pharmaceuticals research and development, and particularly in the development of innovative marketing techniques. This company, the brainchild of a young chemist from the Carlo Erba company, has already succeeded in its ambition of industrial autonomy.

Sifra Est, a company that uses high technology processes to produce its sanitary products, has also left the Trieste BIC incubator to establish its own factory.

In addition to these enterprises, both characterized by a high added value in terms of technology, there is **Systhema** a microelectronics company established by two engineering students, Andrea Martini and Damiano Waldner. Through intelligent partnerships with companies such as Epson, Hewlett Packard, and the Italian company Claber who have recognized the value of its innovations, Systhema became both operational and autonomous within a period of two years.

Systhema was recently chosen by the Epson group as the sole distributor of its components throughout Italy and specifically to provide know-how and back-up services for the technology they produce.

Another case in the electronics sector is **Elcon**, established by Luciano Generali.

One of Elcon's most innovative products is an electronic device to monitor the driving position of articulated buses that has been adopted by the most important Italian bus manufacturing companies.

Finally, the **Talent** company established by Sergio Stabelli, a researcher at Magneti Marelli, and Prof. Claudio Schneider, professor of biotechnology and collaborator at the Interuniversity Biotechnology Consortium laboratory at the Research Area, is proof of the interaction and ties between BIC and local scientific support structures. Talent has developed a system that extracts the DNA of bacteria and human cells automatically, thereby reducing the five hours of manual preparation to a completely automated 15-minute process. The patented process is being marketed by Kontron Instruments, the international leaders in this sector.

This impressive picture of entrepreneurial success justifies Trieste BIC's strategy which is founded on the selection of innovative, high technology enterprises and on their incorporation into the local business and scientific scene.

Today, the Trieste BIC model is ready to be reproduced, with the necessary modifications and adjustments, in other areas of Italy and primarily the North-East border areas.

Vectorpharma International—A Company in the Forefront

Vectorpharma International specializes in the development and production of innovative pharmaceutical products. Established in 1987, the company has been assigned R&D contracts by approximately 20 of the leading national pharmaceutical companies.

In 1991, the company began introducing its technology into the United States and today the prospects for entry into the European market are very promising.

"We decided to become part of the Trieste BIC three years ago," said Vectorpharma president Fabio Carli, "for two main reasons: the logistic support that BIC was able to provide by placing laboratory and production areas at our disposal; and the services it offered, such as centralized accounting and legal consulting services. During the initial period, access to all of these services and to other facilities such as the cafeteria and the centralized postal service relieved us of the need to resolve many incidental but nonetheless important problems involved in running the business. This enabled us to concentrate all our attention on those aspects more directly concerned with technology and market development."

Researchers account for 70 percent of Vectorpharma's personnel. Its highly qualified staff has enabled the company to acquire 120 patents on the world's major pharmaceutical markets.

"At the outset," continued Carli, "the main problem we faced in getting the company established, was that of presenting a marketing policy and an image that was in line with the technological potential developed within the company. Our presence within a recognized structure with prestigious headquarters such as the Trieste BIC was fundamental in making a name for the company and allowing it to establish itself on the market."

Vectorpharma is included in the list of highly qualified laboratories that are authorized by the Ministry for University Education and Scientific Research to undertake research on behalf of third parties.

In addition, in 1991, after a series of inspections, the Ministry of Health authorized the company to produce innovative pharmaceuticals. "This dual recognition by our national and international clients, and by the Italian ministries," stressed Carli, "is an indicator of our success and is encouraging us in our plans to set up a new establishment outside BIC, given the need to increase our production and laboratory activities. If I had to give a reason for our success three years after joining BIC, I would highlight the technological originality of our production processes. This originality is never merely an

end in itself, but always focuses on the real needs of the pharmaceutical companies that are our clients. Another determining factor has been the ability to disseminate the contents and the nature of our technological innovations coherently and efficiently. In this context BIC has been an important source of qualified and efficient support in the establishment of Vectorpharma International."

[Box Insert] Identikit of the Trieste BIC: Its Corporate Structure, Financial Instruments, and Services

Corporate Structure

Trieste BIC is a joint stock company with a capital of four billion lire. The stockholders are: SPI; Friulia Regional Holding Company; Finreco; Trieste Chamber of Commerce; Trieste Association of Industrialists; Small Businesses Association; Independent Committee of the Port of Trieste; SMAER; Trieste Town Council; Muggia Town Council.

BIC's Financial Instruments

Law No. 26—The Trieste Fund guarantees 20 percent of the capital cost of fixed investments and contributions to the cost of research.

Law No. 45/88 guarantees 20 percent of the capital cost of fixed investments, and 50 percent of the management costs for the first three years.

SPI provides funding from a 5 billion lire fund. Finfidi contributes by providing guarantees agaisnt investments.

The Trieste Savings Bank provides ordinary mortagage loans. EC funds for these centers are also available.

Services and Logistic Support

BIC provides the actual areas in which the enterprises can be set up, and also makes the following services available to all its associates:

- Project feasibility studies (project analysis, program of activities, training for the entrepreneur and his staff, financial assistance, consulting).
- Administration services
- Logistic services
- Secretarial services.

For further information contact BIC Trieste S.p.A. [Inc.] 23/2 Via Flavia, 34148 Trieste, Tel. (040) 89921.

Germany: Strengths, Weaknesses of University Research Viewed

92WS0740A Duesseldorf HANDELSBLATT in German 23 Jul 92 p 20

[Article by Georg Heller: "Cottbus Technical University Should Continue To Be Spared Fate of Mass-Production University"—first paragraph is HANDELSBLATT introduction]

[Text] Industry and research: How might the science scene look in the year 2000? The plan for Cottbus Technical University (TU Cottbus), founded a year ago, exhibits no reservations with regard to either science or industry. Its founding president, Prof. Guenter Spur, wants to make use of the "full creative potential" that he had when it was founded. The new university should meet the requirements imposed on it by today's industrial world for research and instruction.

In the founding concept it is programmatically stated that "the achievements of our universities, especially in the domain of research, must develop more innovative power from the point of view of industry." To this end, it is necessary to create forms of communication that will shed light on the universities' current research projects and "also enable industry in particular to identify them with the successful applications of these projects."

It is clear to Brandenburg Gov. Manfred Stolpe that science and research must cooperate closely so that Niederlausitz can be transformed into a modern industrial region. In the desire to get things going in the new federal states' fresh start, the new technical university is concentrating on "typical technical, economic, and ecological development tasks" in the region.

Emphases for the New Federal States That Are New

In this way TU Cottbus achievements in research and training should especially serve "the construction industry in the creation of modern, complexly planned structural plants for industrial parks," or the "energy industry, which is undergoing a basic innovation process, also of great ecological importance," as well as "the mining of brown coal, its efficient and ecological organization, including the recultivation problems it creates," and even the "planned major airport, which will mean a challenge in terms of traffic technology with respect to the integration of roads, rail lines, air routes, and waterways."

The organizing of a university in this kind of concrete way into the social tasks of reconstruction to be dealt with sets a trend that is new for the old federal states. The prospects for the organizing of science and research in the Federal Republic through the fresh start in the eastern part of the country constituted one theme at the "SEL Founder's Day Cottbus '92" celebration in connection with the main issue: how the German science scene for the period following the turn of the century is to be organized.

"Nothing is harder to do than to change existing arrangements," Prof. Hans-Uwe Erichsen, the chairman of the university presidents conference, sighed during the discussion engaged in by the scientists assembled at Cottbus. And, because of the advantage of being able to start afresh, Brandenburg Minister of Science Hinrich Enderlein believes that "the modern part of the science scene will be here (in the new federal states) in a few years from now."

Enderlein is striving for "smaller (higher quality) universities," he does not want a mass-production university, and he wants to shorten the time it takes to complete one's studies. He expects to gain a different image for them through universities that are not "general stores," but through specialization—in the new interdisciplinary courses of study too—as well as through an organization in which attention to individuals in groups is still possible.

In response to the slightly ironic question posed by a sorely tried office bearer from an old West [German] university as to how he planned to avoid the onslaught of students that has made mass-production universities out of universities in the West, Enderlein conceded that he had no intention of blowing his top at the conference of education ministers. Nevertheless, he said that he hoped to find supporters there for his ideas about shortening study time as they are being programmatically striven for at TU Cottbus.

The shortening of study time is supposed to be achieved at TU Cottbus "through tightening of the curriculum and greater clarity in the structuring of studies through acceleration of exam procedures, the development of models for initial qualifying exams immediately after the sixth semester, improvement of teaching methods, as well as through more effective individual attention to students" in student groups for which the different faculty study committees are responsible, among other ways.

Founding president Spur is confident that they will succeed in sparing the new TU Cottbus the fate of a mass-production university. At the present time, 1,600 students are registered there; the size of the student body they are aiming for is from 5,000 to 6,000 students. One reason that Spur gave for his being confident of this sounded strange, namely so that the new university could be kept small. The limited development of university construction alone would already impose limits [on the size of the student body], as would also the shortage of housing in Cottbus. More enlightening (and presumably more effective) are Spur's plans for organizing curricula, courses of studies, and responsibility for them, which should make individual attention to students possible with a larger number of students as well.

The representatives of universities, the Max-Planck Institute, the Fraunhofer Society, and industry in Cottbus were in remarkable agreement that the structure of the German science scene is good. Universities, the Max-Planck institutes, major research institutions, and other research institutes funded by the federal government or the states are working on pure research. Science and industry conduct research and development cooperatively at the Fraunhofer institutes and the so-called "with institutes" (institutes affiliated with universities). In addition to this, there is commercially organized research and development in private-sector companies.

The chairman of the university presidents' conference, Prof. Hans-Uwe Erichesen, took a basically positive view of this multiform research system in Cottbus. But he complained that the strain on the universities because of the rush of students has led to a reduction in the research sector's share of the pie.

Should the principle of unity of research and teaching be suspended in favor of increased research outside the university? Erichsen feels that the emphases are misplaced. The publicly funded nonuniversity research sector, which would be assigned only subsidiary and complementary missions, would be overextended while the universities would have ever greater difficulties in carrying out their research function.

So the coordination process would have a deleterious effect on Germany's standing in the world of research if the Science Council's recommendations are followed. Then a large percentage of former GDR scientists would be accommodated at nonuniversity institutes funded by the federal or state governments, 33 of which would be established in the new federal states (there are 47 such institutes in the old federal states). The sharp increase in number of these "blue-list institutes" will, in Erichsen's opinion, lead to "fundamental structural defects and rejections with long-term consequences."

Funds for All Federal States Actually Cut

Erichsen said that the fact that the increased need for funds "required for coordination" will not be provided for in the minister for research and technology's budget will also prove to be detrimental to Germany's standing in the world of research. This would be tantamount to a cut in funds for all federal states.

The president of the Fraunhofer Society, Prof. Max Syrbe, gives the structuring of the German science scene a grade of "excellent." He declares himself to be decidedly against changing these structures just because there is a shortage of funds. Functional organization and decentralized management would be better suited to the different internal research and development objectives than a distribution by specialized fields. It should, however, be the permanent aim of the German research policy to prevent this system from lapsing into disconnected fields standing next to one another.

Bosch managing director Dr. Friedrich Scholl, an industry representative, also certifies that the German science system has a "basically good structure." But, in view of growing international competition and in part declining support for it, Scholl feels that German industry's innovative power and competitiveness are endangered. The Bosch manager calls for "lean production" for science as well. Accordingly, Scholl is of the opinion that we must ask ourselves to a much greater extent than we used to in what fields and for what research can be funded. [Basic] research, applied research, and product development should be more effectively coordinated. It would be more important to select research topics "taking into consideration and sometimes with emphasis

on social and economic objectives." Limitation of the range [of topics] and less redundancy could contribute to greater effectiveness.

In the Bosch managing director's opinion, new forms of cooperation between science and industry must be developed. The quantitative distribution of tasks in the German science system should be considered. He said that too often mainly community projects are implemented because it is assumed that they will receive grants. The system still leaves something to be desired in terms of comprehensibility. If a new field opens up, like, for example, superconductivity at high temperatures, an irrational gold-digger mentality may arise with the danger that scientists and politicians may establish new, superfluous institutes.

Industrial Research Scene in Eastern Germany Reviewed

92MI0742 Bonn BMFT JOURNAL in German No 4, Aug 92 pp 8-9

[Text] The structural change in the new laender has also affected industrial research and development. Enterprises are phasing out research capabilities that the GDR had built up for the sake of self-sufficiency or established wrongly from an organizational point of view. The major difficulties that they are encountering in production, sales, and financing are forcing firms to concentrate for the time being on activities that bring short-term returns.

At the end of 1989, the former GDR had about 87,000 industrial R&D employees. Present-day analyses assume that this number has declined significantly, to a figure between 29,000 and 40,000, depending on the source. Calculations based on the R&D personnel recorded by the Trust Agency at the enterprises under its control and information from BMFT [Federal Ministry of Research and Technology] programs support the figure of 35,000 to 40,000 industrial R&D posts in the new laender.

At some 430 million German marks [DM], the BMFT's industrial funding programs in 1992 alone are helping to secure about 11,000 jobs in research and development. For the most part these are permanent jobs, in newly formed technology-oriented firms, for example, or new research appointments in small and medium-sized enterprises (SMEs).

The BMFT's support program is helping industrial SMEs to create an increasing number of jobs in research and development. BMFT support for SMEs is growing rapidly, as is revealed by the ever-increasing numbers of applications presented and grants awarded, which are closely bound up with the consolidating economic development. In mid-1991, 300 SMEs were receiving funding; today there are 1,050. Increasingly, such funding is going to new or privatized enterprises with a vital interest in conducting their own R&D. About 50 percent of assisted firms were in the private sector in mid-1991; now the figure is around 80 percent.

Now that the Trust Agency, too, is explicitly recognizing R&D efforts and the preservation of R&D departments when privatizing enterprises, sufficient attention and state support are being given to industrial research.

In coordination with industry, the Federal Ministry of Trade, the Trust Agency and the new laender, the BMFT has introduced a series of accompanying measures since October 1991 to make it easier for firms to restructure and to create the conditions for innovation.

- The Federal Research Ministry is concentrating on the following measures:
- building up an industrial R&D infrastructure;
- increasing technological competitiveness;
- setting up businesses on a technological basis, and
- fostering technology-related SMEs.

Industry in the new laender is being quick to take advantage of this set of measures, which is costing around DM350 million in 1992.

Building up an industry-oriented research infrastructure is also helping to enable firms even now to consult innovation advisers at all chambers of industry and commerce and is providing access to data bases through representatives and branch offices in the new laender and facilitating it via information offices in Halle in new fields of technology (CIM [computer-integrated manufacturing] and plastics technology) offer small firms the opportunity to obtain information and advice about possible solutions and the state of the art.

The Fraunhofer Society (FhG)'s nine independent research institutes and 12 branches are proving particularly promising. They were founded on 1 January 1992, but most of them started work before then. They have created some 1,000 applied R&D jobs.

The FhG establishments are available to carry out contract research for industry on the spot. The FhGs research spectrum has been expanded to include such important fields as polymer technology, electron beam and plasma technology, applied optics, and precision mechanics, fields in which the new laender have particular skills and also high requirements.

Priority is being given to ensuring that firms can compete in technology. The BMFT is giving firms and research establishments support in the form of project funding under its various special programs on, for example, environmental research and engineering, the basic technologies of information technology, renewable energies and rational energy use, materials research, and the improvement of working and living conditions. Some DM750 million in project funding are available in the new laender for 1992. A good 40 percent of this (DM300 million) is likely to go to firms, some DM240 million of this in the form of R&D project funding.

Because of the difficult situation facing industry-oriented R&D capacities, in 1992 the BMFT has also

made DM80 million available from the joint "Upturn in the East" campaign as bridging finance for some 250 R&D projects.

The BMFT has scored particularly great and lasting successes in promoting the formation of technology-oriented businesses. Support for the constitution and expansion of technology and entrepreneur centers and for the formation of technology-oriented firms began on the BMFT's initiative and in consultation with the Ministry of Research and Technology of the former GDR as early as June 1990. Twenty-three months later, 13 of these 15 centers are now fully operational. Funding of DM32.5 million authorized by the BMFT has helped to equip 16,000 m^2 of commercial premises for 225 new firms that are now already providing 1,000 specialized jobs. The ultimate aim is for what will be a total subsidy of DM40 million to fund 77,500 m^2 of business premises for 500-600 new firms employing 5,000-6,000 people.

A piece of particularly good news is that the new laender have in the meantime been setting up 15 further technology and entrepreneur centers on their own account, which will probably begin operating in the next two years.

The pilot "Formation of Technology-Oriented Firms" scheme has also proved very popular among people starting their own businesses: by 31 March 1992, 576 outlines for future businesses had been submitted. This program alone has created some 400 new jobs for research and development workers.

The BMFT's aid for the restructuring of industrial research in the new laender is complemented by the resources available for supporting small technological businesses. Support has been given to more than 1,050 firms and research establishments since September 1990.

With its scheme to encourage firms to engage more research personnel, the BMFT has helped 400 firms in 19 months to take on 1,200 people.

The "Contract Research for the East" scheme has made it easier for firms in the new laender to gain access to outside know-how. The BMFT provides 50 percent of the funding involved. So far, this has secured about 2,500 jobs in R&D, at least for a time.

The "Contract Research for the East" scheme was introduced this year to steer R&D contracts towards the new laender. The funding helps R&D facilities to lower their prices so as to penetrate the market for R&D services, where competition is very keen in the West, and to obtain reference contracts. This has so far secured 500 research and development jobs, at least for a time.

By creating a research infrastructure, encouraging innovative small business, and promoting particular industrial R&D projects, the BMFT's measures have helped to bring about significant improvements in the situation in the new laender. But the crucial factor for the future of industry in the new laender remains the willingness of firms themselves to take the initiative in giving research and development the priority it deserves in a high-tech nation open to world trade.

Decline in Eastern German Researchers Summarized

92WS0765A Hamburg DIE ZEIT in German 31 Jul 92 p 33

[Article by Dieter E. Zimmer: "The 'Winding-Down Process' Swept Across the GDR With Ambiguous Results—Tell Me Where the Researchers Are"]

[Text] No, contrary to general fears, no neutron bomb exploded here on New Year's Eve, said Jens Reich, who is not only one of the most sensitive interpreters of the troubled communications between the two parts of Germany, but also a biomathematician at the former Central Institute for Molecular Biology in Berlin-Buch which used to be the leading scientific center for the whole East Bloc. Today, it continues to exist under the name of Max Delbrueck Center for Molecular Medicine (MDC) as one of the three new large research institutions in East Germany. Previously, the three institutes in Buch which continue to exist under MDC had a staff of 1,600; today, 360 are left. Still, for the time being nearly 80 percent of the previous employees found work on the Buch campus. According to Reich, most of them are still there and continue their previous work. But he also mentions the other side of the coin: the insecurity, which has paralyzed all efforts for two years and which has not disappeared yet, the bitterness of some older colleagues, the brain drain to the West of the younger ones—and the fact that an emergency program for German science was sorely needed.

On the one hand, many of the people who worked in research in the previous GDR not only saw their careers come to an end, but also lost their positions and jobs and could count themselves lucky if they were old enough to take early retirement or receive a social security pension, an insultingly low pension at that. On the other hand, there are new research institutions being built everywhere, many people continue their work there and may soon have better working conditions than before. It is not easy to reconcile these two views, but both are correct.

Werner Meske, an expert on scientific statistics, who now works at the Scientific Center for Social Research in Berlin, converted GDR statistical data to western standards. He came to the following conclusion: Relative to population size, the GDR had at one time as many researchers as the West. In both countries, most of the research and development activities were industry-related: 65 percent in the East, and 74 percent in the West. University research as a percentage of total research was almost the same in both countries: 11 percent in the East, 14 percent in the West.

The greatest difference was in government research outside the universities. With 24 percent it was twice as high in the GDR than in the West, and it was concentrated in the centrally controlled research combines of their three academies: the Academy of Construction, the Academy of Agriculture, and first and foremost the Academy of Sciences (AdW) with its nearly 60 institutes and approximately 24,000 employees at the end. Unification meant that they would all be part of the "winding-down process": by New Year's Eve the last institutes were dissolved, the last employees were laid off. Where are they now?

Take the linguists, for instance. The row of gray flat buildings which was once crowded by many of the humanities institutes of the Academy of Sciences is now quiet and empty. Those who are still present don't do research, they are closing down. Linguistic historian Joachim Schildt, an expert on the German language during Luther's time, is head of the "winding-down team" for the previous Central Institute for Linguistics (ZISW). He has a lot to tell, and not only horror stories.

Just like any other AdW institute, the ZISW had to be evaluated by the scientific council. At the end of 1990, the commission, which had been awaited with great anxiety, came for a one-day visit. They spoke with the department heads and separately with the other staff, and laid down their conclusion in a 30-page opinion. They were full of praise; a research group working in a field encompassing logic and linguistics headed by the internationally renowned linguist Manfred Bierwisch rated it as "particularly outstanding." The fact that they nevertheless recommended its dissolution surprised no one; even in the GDR era, the institute had considered splitting up because it was too big and heterogeneous. The opinion did give specific and detailed recommendations on how to continue the work.

By the end of 1991, 180 of the 220 staff members were still left, among them 160 scientists. A few had found other jobs, younger computer linguists, for instance, found work in industry; an expert on Albanian had been offered a professorship at the University of Munich. Compared to other AdW institutes, the loss rate was very low; an unusually small number had elected early retirement. Of the remaining 160 scientists, 30 joined the "eternal" projects of the new Academy of Sciences in Berlin (e.g. the Grimm and Goethe dictionaries), 22 joined the Institute for the German Language in Mannheim which meant a healthy injection of linguistic history know-how for the institute, 20 joined the new research centers for the humanities of the Max-Planck-Society (MPG). Forty to fifty hoped that their paid positions would be integrated into a university, a good number continued their work in positions funded by the job creation program. According to Schildt, only five to 10 colleagues have not been able to find anything, and some of them probably had not tried at all.

It has not been that painless everywhere. However, the attitude towards evaluation by the scientific council seems to have changed. Initially, many considered this evaluation insulting and humiliating. However, those that emerged from the purgatory unscathed seem to display a quiet sense of pride. They now have written proof that their work was valuable not only in the special GDR situation. Approximately two thirds of the AdW researchers received a favorable rating. This was more than had been expected, and their continued employment will be expensive; therefore, there is a great incentive to cut down on the scientific council recommendations.

The agency which was responsible for the winding-down process in the academic area coyly hid this in its acronym. It called itself KAI. On the one hand, "KAI" organized the end of the old academic institutes, on the other hand, it greatly helped establish what is now called the new scientific landscape in the united Germany. In doing so, it found new jobs for almost 13,000 of the 16,000 AdW staff.

It was a great success, made possible by a lot of ingenuity and sensitivity. It only had one unavoidable flaw. Most of the new jobs are for a limited time only. Naturally, this applies to the 2,000 jobs under the job creation program, but also to the new research centers of the MPG which were designed specifically in such a way that they can be dissolved again in a few years. Even in the new establishments which are solidly funded by the federal and state governments, the researchers are only granted a trial period, so to speak. Most contracts are for three or two years or eighteen months. Scientists whose careers in the GDR were completely safe from the time they enrolled at the university until retirement find it particularly hard to see insecurity as an opportunity to prove themselves.

The greatest concern, however, is WIP, the Scientist Integration Program, which is to pave the way to the universities for about 1700 AdW researchers using funds from the University Renewal Program (HEP) for which the federal government provides DM1.7 billion. It was designed to run for five years; so far, funding has been guaranteed for only two years, and this is by no means enough. Universities will hardly have openings for colleagues from the academic fields at a time when eastern German universities have to lay off some of their own staff.

And this is the bottom line: Of the 32,000 persons who were employed by one of the three academies, approximately 13,000 will continue working for the time being, i.e. a 60 percent reduction. Personnel reduction at the universities has just now begun; if it turns out to be as drastic as it has been in Saxony where 7,500 jobs will disappear out of a total of 18,500, the GDR universities will be left with a staff of maximally 60,000 down from 104,000—a 42 percent reduction. The biggest cutbacks, however, occurred in industry. Here, only 18,000 of about 74,000 R&D positions remain—a 76 percent reduction. This process took place without any remedial measures, and this almost-collapse of industrial research

which affected electronic engineering particularly hard makes any normal osmosis impossible: hardly anyone from the shrinking government research institutions finds his/her way into industry.

At one time, there was a total staff of 210,000. Soon, there will be 91,000 left, and that only for a limited time. Moreover, 10 percent of their positions are to go to people from the West. This means that unification of the two Germanys meant a job loss for far more than half of all people working in the sciences in the GDR.

This is not only a personal catastrophe for many. It is also a structural one for the whole country: Relative to population size, eastern Germany today has only half as many R&D positions as western Germany—and only one tenth relative to the number of people employed in industry. The best and most flexible ones go the West. And the ailing economy which urgently needs new products and new processes is further handicapped by the thinning out of the innovation potential.

Germany: SPD Spokesman on Microchips, JESSI

92WS0762A Duesseldorf HANDELSBLATT in German, 31 Jul 92-1 Aug 92 p 5

[Text] The research and technology expert of the SPD faction in the Bundestag, Siegmar Mosdorf, has welcomed the recently announced American-German-Japanese cooperation of IBM, Siemens, and Toshiba in the development and production of the generation after next of chips—the 256-megabit chips.

It is very significant, according to Mosdorf, that a German firm, Siemens, should be participating in the development and production of the crucial key technologies of the 21st century. Important also is the fact that the first "triad cooperation" has now finally begun in a cross-section technology which is so crucial for the national economy and its productivity.

The research and development costs in this field, which require more and more capital, according to the Social Democrat, could in the future scarcely be born by one producer alone. Therefore, similar to the approach used in national security policy among nations, also in the research and development of new technologies more cooperative ventures must be undertaken. "The triad as a model for cooperation is better in any case than the triad as a model for trade wars," said Mosdorf.

At the same time it is also critical, according to Mosdorf, whether the production of the 64-megabit chip and the 256-megabit chip will take place in Germany and Europe. This is because the site for the factory of the 21st century, which is necesary for their production, will also decide the quality of tomorrow's sites generally. Also this decision would mean that the European JESSI program would now have to undergo a thorough revision.

The program had been conceived, according to Mosdorf, as a European catching-up program for memory chips, but because of its bureaucratic and non-specific execution had scarcely had any effect at all. "The Europeans must now concentrate more on the use of the highly-integrated chip (ASIC) and on software." It would now also be appropriate, said Mosdorf, to think about cooperation in research between the JESSI project and the Sematech project.

Audi Executive Piech on Strategy Against Japanese Competition

92WS0762C Duesseldorf HANDELSBLATT in German, 31 Jul 92-1 Aug 92 p K1

[Text] "The nineties will be a decade of decision for the European automobile industry," Dr. Ferdinand Piech predicts. It is equally clear to him that: "With conventional methods of management we will not be able to meet the challenges which face us."

The MIT study furnishes important answers to the question of Japanese market success, the top boss designate of Volkswagen believes, speaking in a self-critical vein. "It demonstrates that European producers above all have a great need to catch up with the Japanese with respect to company management and organization of production."

Acording to Piech the Japanese still have a cost advantage of about 25 percent over European producers. We will only make up for this cost disadvantage if we begin with the entire chain of value creation. In this way, in five years, the entire difference could not be made up, to be sure, but "we must and will make a great leap ahead."

The Japanese lead in performance is essentially based on the fact that production is carried out according to the "lean/fragile method," in other words with extensive elimination of buffers and finishing stations during production, as well as through the organization of auto construction into the most simple possible production processes.

Company manager Piech doesn't think much of culture-related explanations. "If the Japanese factories in the U.S., and particularly also the Nissan factory in Great Britain are doing substantially better than the Europeans, it means simply this—that the Japanese production method can also be applied successfully in other cultural regions."

In order to hold their own in competition with the Japanese, Audi's chairman of the board believes, European producers must be mindful of their particular strengths. "We won't copy the Japanese. We want to realize our European culture and our particular strengths of individuality and creativity. Our approach is a combination of European innovative power and the continuous improvement which is used in Japan."

An important strategic goal, scion of Porsche Piech argues in Career Discussion at the "European Chairmen's Symposium," which was organized by *Handelsblatt* and the *Wall Street Journal Europe*, is to offer products which are geared to the market. Now that material demands, such as matured technology, economy, comfort, prestige, durability, and safety, have been largely satisfied, it will now be more a matter of non-material needs.

In Piech's view these needs first and foremost are quality of technical support, comprehensive guarantees in the sense of unlimited availability, and, most important of all, the solution of ecological problems. "In my understanding this includes integrated traffic concepts."

In his concepts of business an important area of responsibility for the head of Audi is definitely the human being. "In European companies," he finds, "we are still dealing today with predominantly goal-oriented communities." They are characterized by the fact that management tries to communicate its ideas to employees—even though often unsuccessfully.

By contrast Japanese managers and workers see themselves as an integral part of the company family. "Here we are dealing with spirit-oriented communities, which are characterized by such values as cooperation, respect, and trust."

The professed goal for Audi and for Volkswagen according to Piech: That the human being and not the machine should be at the center of the work organization. "I am convinced that the human being, with his varied opportunities must be able to evolve and develop more strongly. In addition to technical competence this also means the development of capabilities which bring cooperation, planning, and creative potential more strongly to fruition."

In addition to the development of key qualifications, which is of prime importance, in the composition of work groups and project teams the various personality types would therefore have to be taken into account and integrated to a much greater degree than before.

France: PUMA Program To Increase Aid to PMEs

92WS0767B Paris COMPOSITES ET NOUVEAUX MATERIAUX in French 3 Aug 92 p 1

[Article entitled: "PUMA Contacts 7,000 Small and Medium Companies (PMEs) in Ile-de-France to Help Them Integrate Advanced Materials Into Their Operations"]

[Text] As part of the PUMA program, the Ile-de-France Regional Directorate for Industry, Research, and the Environment (DRIRE) has just launched an educational drive to make PMEs more aware of the possibilities for integrating advanced materials into their technological development. Although PUMA has existed since late 1990 (see No. 100 of COMPOSITES ET NOUVEAUX MATERIAUX), few companies have so far taken advantage of the technical and financial assistance it offers.

The PUMA procedure enables small companies and industries located in Ile-de-France to update their technology after completion of a feasibility study. As one of PUMA's officials, Rene-Jacques Bahu, stresses, "the procedure does not finance innovation, as ANVAR does, but rather helps companies integrate advanced materials into their production process. The objective of DRIRE's PUMA agents is to demystify the use of new materials."

Many manufacturers still think of new materials as being difficult to use and costly. It is this image of inaccessibility that DRIRE would like to dispel, by granting interested companies subsidies for feasibility studies and loans which they can reimburse by developing prototypes or pilot runs.

Of the 7,000 Ile-de-France companies—excluding building trades and agrifood firms—contacted last June by the Ministry of Industry, 300 have already responded. Half of the companies requested a visit from an agent, and 35 to 40 files are being initiated in response. Considering that in an 18-month period, only 100 companies had put in requests for PUMA procedures, that is not a bad result. Rene-Jacques Bahu, DRIRE, 10 rue Crillon, 75004 Paris; Phone: 44 59 47 26; Fax: 44 59 47 00.

EC Finds Advanced Materials R&D Lagging

92WS0767D Paris COMPOSITES ET NOUVEAUX MATERIAUX in French 3 Aug 92 pp 5, 6

[Text] Pointing to the goals—particularly those relative to industrial competitiveness—set out in the Treaty of Maastricht, the European Commission in the person of Filippo Maria Pandolfi is asking for a substantial increase in EC funding of technology research and development. At the same time, the Commission has proffered a rather harsh assessment of Europe's technology R&D. It bases its analysis on an Input/Output ratio that compares what is channeled into the technology research circuit (in terms of human capital expenditure) and the resulting output (patents, high-technology products). These indicators show that the Community's technological potential is underfunded compared to its competitors, and that the knowledge and products generated by the R&D are transfered to the market too slowly.

To start with, the ratio between TR&D spending and gross domestic product (GDP) shows Europe investing less than its two big competitors, the United States and Japan. The percentages in 1991 were 2.8 for the United States and 3.5 for Japan, while the EC invested 2.1 percent. The Community's present level of investment is comparable to what Japan's was 10 years ago. A look at patents filed also shows sluggish European innovation. For the first time, foreign companies filed more patents in the United States in 1991 than American firms did. But in this general shift, Europe's position is slipping.

Indeed, over the last few years, Japan has taken out more patents in the United States than the EC 12 combined. A study of U.S. patents shows, for instance, that compared to the late 1960s the United States's emphasis has shifted from electronics and automobiles to defense and raw materials (chiefly energy). Japan has moved in the opposite direction. Europe's specialties are more varied. Germany holds strong positions in chemistry, mechanical engineering, automobiles, and defense, but has slipped in electronics. Europe appears to have fallen behind in the area of advanced materials. Except for metals and magnetic materials, it is seriously lagging in anything related to metal-, polymer-, or ceramic-matrix composites, optical materials, electronic ceramics, or superconductors.

The dynamics of companies are what make or break an innovation policy, which implies making strategic choices. It is not because Europe's research is inferior to Japan's or the United States's that it fails to deliver enough international competitive advantages. Rather, the problem with European research is its limited ability to combine TR&D and innovation in an overall strategy that channels and puts them to work. Innovation alone does not make for efficient production: The needs and desires of the consumer must also be met.

Table

Europe's Position Vis-a-Vis Competitors

Areas	Position relative to competitors	Industrial prospects
Advanced Structural Materials		
Metal alloys	+	=
HP polymers	-	+
Metal-matrix composites	=	=
Polymer-matrix composites	-	+
Ceramics engineering	-	+
Ceramic-matrix composites	-	+
Advanced Functional Materials		
Display materials	-	+
Electronic ceramics	-	+
Magnetic materials	+	=
Optical materials	-	+
Superconductors	-	+
Advanced Treatment of Materials		
Manufacturing to finished dimensions	-/=	+
Process design	-/=	+
Process control	-/=	+

Germany: Problems Transferring Technology to Small Firms

92WS0776A Duesseldorf WIRTSCHAFTSWOCHE in German 7 Aug 92 pp 36-40

[Article by Christian Deutsch: "Questionable Uses: Transfer Centers—a Proposal for Small and Midsize Businesses"]

[Text] **The conventional, state-subsidized transfer offices pay too little attention to a company's operating problems.**

The idea must have been hatched by the devil or, what is more precise, by the competition. "And we invested a lot of time and money in it," complained Claus Hahn, business manager at Teleka GmbH, a producer of satellite dish antennas in Weinstadt-Beutelsbach near Stuttgart.

Hahn thought that he could acquire the required know-how to convert his development idea through the transfer office of a university. He discovered too late that the scientist to whom he had turned trustingly happened to be the personal friend of a competitor. All too often, the head of Teleka learned in the meantime, market leaders of a segment sponsor the institutes and their directors.

Hans-Gerhard Komm, head of marketing at the Gutex Fiber Plate Plant in Waldshut, also felt he had been had. Together with a transfer center, the company had developed new ideas for products, which, however, were never realized. Later, it was found, the transfer office had gone about hawking the same ideas at other companies. In this way, Komm learned to his dismay, that his company's know-how had found its way in to the development offices of the competition.

It is no wonder that most small and midsize businesses steer clear of the transfer offices. The transfer system, which is publicly supported to the tune of 100 million German marks [DM] per year, has failed to live up to its commitment to make scientific know-how available to small and midsize businesses.

An investigation conducted by the Institute for Applied Innovation Research [IAI] at Bochum University confirms this. 750 small and midsize businesses in North Rhein Westphalia were questioned about their sources of information for innovation processes. The study limited itself to businesses that had announced patents. Even these innovation-active companies made a devastating judgment against the transfer offices. Only 16 percent consider the offices to be an important source of information.

As for the total number of businesses, Erich Staudt, the director of the institute, concludes that they are favorably disposed to the midsize businesses, i.e., establishments in the pro mil range. According to Staudt, the approximately 200 state-financed transfer offices do not function well "because their initiators have proceeded from a naive technocratic notion that the scientific

system constantly produces some kind of know-how that eventually filters down into practice." It would therefore be logical to presume that one need only install a kind of "brokering" system to accelerate the process.

This is a dangerous error, Staudt insists, because "the two sides—science and practice—are incompatible." While the scientist is in search of laws and knowledge, and thinks in terms of three- to five-years, the businessman wants the fastest possible specific solutions for complicated problems.

To do justice to both parties, a transfer office would have to know both the company problem as well as the appropriate science partner for each specific case. "That simply does not happen," Staudt says from long years of experience. "A broker does not exist who is familiar with all conceivable small and midsize business problems and who, at the same time, knows what the worldwide scientific community is offering as a remedy. He would have to be a demi-god."

Just about half the transfer representatives in the universities work alone, at most out of a single office. Only 8.4 percent, according to a study conducted by the Kassel Polytechnic on the "Qualifications of Transfer Personnel," have more than six employees.

Furthermore, university professor Staudt observes, only about one tenth of the know-how, required for an innovation, originates in universities and research facilities. Ninety percent stems from other sources, i.e., they are, for example, either pinched or otherwise obtained in fairs or during Japan travels from the competition.

The transfer representatives are frustrated by the fact that their services are not requested. Although almost all transfer employees have a positive opinion of their field of work, the Kassel report noted, over half of them are dissatisfied with their work and want to change jobs.

Staudt also wants to eliminate the superfluous intermediary office between science and transfer. For the universities, this would mean establishing specialty-oriented "competence centers," in order to be able to define the proposal professionally. Former employees at transfer offices might also find employment in such facilities, by conducting intensive publicity work for the shy labor researchers.

Peter Kayser, author of the Kassel study and himself a transfer representative at the Institute for Solar Energy at Kassel University, notes that increasingly more transfer people are now limiting themselves to conducting information services for their universities and to organizing fair visits.

The businesses, for their part, have to define their need for innovative know-how accurately and most probably will have to seek out other business partners for complicated projects. A task that asks too much of many small and midsize businesses. In these instances, Kayser suggests, the transfer offices could become active in project coordination.

To be sure, a coordinator of this kind would scarcely have a chance of being accepted in industrial circles without a few years of industrial experience. But after he has once gained some experience in industrial circles, he would politely reject the transfer job. Who, Kayser asks, would want an underpaid, state-generated position in industry?

As the Steinbeis Foundation shows, transfer can be very efficiently organized by means of a network of individual offices. Teleka has proven this. The company, which was founded in 1989, would probably not have survived without the support of the Steinbeis transfer office in Villingen-Schwenningen. Thanks to the cross connections within the Steinbeis Foundation, a concept for development was found by means of which the company could—in a neat way—make itself independent of expensive Far Eastern suppliers.

Today, this satellite dish antenna producer in the Remstal region is considered the technological leader in its field. Company head Claus Hahn and his 21 regular staff members have even won the Olympic gold. They received the contract to set up the ARD receiving systems in Barcelona.

Steinbeis Foundation: a Know-How Network

A transfer system—the Steinbeis Foundation, organized on a strictly business footing, has been successful in Baden Wuerttenberg. Ninety-five percent of the foundation's income—about DM80 million in 1991—was derived from consultation, research, and development assignments. This shows that the services for the targeted clientele reach the small and midsize businesses. After Johann Loehn was appointed board chairman of the Steinbeis Foundation for Economic Advancement in Stuttgart, the establishment was essentially revitalized. "Our guiding principle is value for the client. All activities have to be oriented in that direction." To bridge the gap between science and the economy, Loehn has built up a two-stage organization:

- A network consisting of about 30 managerial experts, who speak the company's language. As "cross-section thinkers," they analyze a company problem and then decide which specialists should intervene.
- Behind them are some 2,500 specialists, primarily scientists from Baden Wuerttenberg universities. Loehn has recognized that it can not be left to the scientists to make the first contact in the companies.

Even when the professors go into action in the second stage, they are not permitted to engage in idle academic discussion. "Steinbeis operates on a strictly market basis, Loehn emphasizes. Since the 129 regional centers have

been established to show a profit, it is quickly determined when a scientists is truly needed in the economic sector. The professor removes himself when his services are no longer paid for."

Thus, in late 1991 six centers were shut down chiefly because the skills of the scientists there were no longer requested. The transfer system of the Steinbeis Foundation is not just of interest to the companies because of the great amount of know-how it offers by virtue of its 700 available professors. The foundation, in addition, builds its competence from the roughly 32,000 projects and more than 10,000 company contacts. By means of a well organized network, access to the entire available store of know-how can be achieved for problem-oriented applications.

In this way, Loehn notes, comprehensive solutions, which extend far beyond the simple transfer of technology, can be arrived at that no engineering office or company consultant could possibly offer.

Loehn concludes: "Small and midsize companies in Swabia and Baden, which normally cannot afford expensive research expenditures, have—in the foundation—found a way to overcome their conventional constraints."

Portugal: National Laboratory Name Change, New Functions

92WS0783A Lisbon O INDEPENDENTE in Portuguese 14 Aug 92 p 11

[Article by Maria do Rosario Homem: "Negotiated Research"]

[Text] *The LNETI [National Industrial Engineering and Technology Laboratory] has new statutes. It will be known as the INETI [National Institute of Industrial Engineering and Technology], and is available for establishing joint ventures with private partners to create new research units and to participate in risk capital businesses. And there are already candidates for the INETI's new areas of responsibility: they are the industrial associations.*

The new statutes of the LNETI have just been approved by the Council of Ministers. The National Engineering and Technology Laboratory will be known as the National Institute of Industrial Engineering and Technology. It is acquiring greater functional mobility, because it can negotiate research, development, and demonstration (RD&D) activities with private enterprises.

According to the state secretary of industry, Alves Monteiro, who was contacted by O INDEPENDENTE, "With the new statutes, the INETI is equipped to engage in joint ventures with private or public entities, in order to establish partnerships that will give rise to new scientific and technical research units."

Also included among the functions of this new institute is participation in risk capital partnerships in high-tech companies. Expanding the INETI's activity in the creation and development of technological centers and schools is another function to be discharged. The possibility is also "open" for this agency to establish program contracts in strategic fields.

This policy of gradual privatization of Portuguese "research" involves negotiation with private entities for the "sale" of the various RD&D institutes comprising the INETI's structure, and also of its scientific and technical centers. The entire technological policy for the sector is assigned to the protective area, excluded from any privatization.

According to the new statutes to which O INDEPENDENTE had access, the INETI privatization model entails the transfer of the assets of the various institutes to the new entrepreneurial unit to be established, which will have public and private capital. This transfer could be made on a permanent or temporary basis, and might be achieved through sale or through capital stock conversion. If the option is not taken for complete privatization of a particular institute, the new statute stipulates that it may be turned over for operation to some private entity desiring it. Similarly, the personnel will be assigned to these new structures, if they agree; however, they will lose their connection with public service.

Moreover, the destination to be given to the nearly 1,200 persons working in the ex-LNETI is one of the problems of concern to the trade union sector. The fact is that this number is considered too high, and it is anticipated that some may be integrated into a surplus work force. Also yet to be decided is the status of the nearly 900 grantholders in the ex-LNETI, whose link with this agency is uncertain.

One of the main reasons underlying the new system now authorized, using the model followed by other European countries, is the solution of this agency's financial problems. An attempt is being made to give financial autonomy to this institute, which is still consuming from the government a budget considered too large. Alves Monteiro claimed: "The ex-LNETI's operating budget has imposed an increasing burden on the revenues assigned to the MIE [Ministry of Industry and Energy]." In fact, the funds to be allocated to the INETI in 1992 represent nearly 38 percent of this ministry's revenues. The funds assigned in 1991, which totaled nearly 3 million contos, accounted for almost 37 percent of the revenues from industry; whereas in 1989 they represented close to 34 percent.

With this decentralization process, it is the government's intention to establish systems of cooperation that will reduce its costs accordingly. In this way, the INETI will be able to have a self-financing capacity on the level of 50 percent: the percentage deemed necessary to ensure the financial autonomy of this public institute.

Already interested in establishing joint ventures with the ex-LNETI are the industrial associations, the AIP [Portuguese Industrial Association] and the AIPortuense [Porto Industrial Association], as O INDEPENDENTE learned. This is all the more so because the opinions of these associations will be heard in the naming of the voting members of the board of directors, and some of their members could join the new business technical council.

The INETI organs consist of a board of directors comprised of a chairman and two vice chairmen, as well as two voting members, the latter named after a hearing of the business associations' views. There is also a business technical council, whose mission is to give its political opinion of strategic programs, draft budgets, and investment plans, and of the INETI's annual activities program as well. This body, similar to a model already tested in the IAPMEI [Institute for Support to Small and Medium-Sized Industrial Enterprises], consists of a representative from the Council of Rectors of Portuguese Universities, a representative from the Planning Ministry in the scientific area, the general directors of the General Directorate of Energy, the General Directorate of Geology and Mines, and the General Directorate of Industry, as well as the heads of the Portuguese Institute of Quality and the IAPMEI. Also affiliated with this structure is a representative from the financial system, together with three industrial entrepreneurs of acknowledged qualifications and competence, as may be read in the new statutes.

Riesenhuber Visits Japan, Calls for Exchange of Scientists

92WS0784A Duesseldorf HANDELSBLATT in German 20 Aug 92 p 3

[Article by B.A.G.: "Riesenhuber Informs Himself in Tokyo; Greater Exchange of Scientists Called For"]

[Text] Bonn, 19 Aug 92 (HANDELSBLATT)—Minister for Research Heinz Riesenhuber (CDU [Christian Democratic Union]) has called on German industry to conduct research and development in Japan. In the process, let the chemical industry assume the role of forerunner at the present time, said the minister, who is to visit Japan for 10 days to obtain information about technology trends.

The minister emphasized that Germany must not lose sight of the Asian challenge despite the urgent reconstruction of the new federal states and the integration of Eastern Europe. Strategic cooperative ventures like the one Siemens, IBM, and Toshiba have agreed on to develop chips are the right way to go alongside development of their own research capabilities in Japan.

Riesenhuber said that the German economy does not have enough presence on the markets of Southeast Asia, the "most dynamic markets in the world." Only 7 percent of the so-called research-intensive products that would be imported in this region—products for which the expenditures for research and development come to more than 3.5 percent of business turnover—come from Germany. The Japanese supply nearly half of them.

Riesenhuber demanded that exchanges of scientists and students be increased. While nearly 1,900 of their Japanese colleagues were spending time in Germany, between April 1990 and April 1991, exactly 613 German scientists visited the Asian island state.

Only 10,000 Germans are studying Japanese, he further criticized the situation. In Japan, on the other hand, German is the second foreign language after English. All told, the number of Japanese students studying German is estimated at 1.5 million, a half a million of them alone in universities.

This is why from 1993 on, the Ministry for Research will be making DM100,000 a year available for study visits in Japanese firms. Engineering, natural sciences, and economics students are to be helped with these grants. Riesenhuber announced that, should this program prove to be successful, the funds could be multiplied.

The CDU politician is to meet with Minister of Science Kanzo Tanigawa, Minister of Trade and Industry (MITI) Kozo Watanabe, and the head of the Department of Culture. Furthermore, visits to science institutes and business firms are planned.

SPD's Fischer on Research Policy, Strategic Alliances

92WS0784B Duesseldorf HANDELSBLATT in German 20 Aug 92 p 5

[Article by P.H.E.: "Interview With Niedersachsen Minister of Economy—Reform of German Right To Compete Called For; Fischer Calls For Merger of Ministries of Economy and Research"]

[Text] Duesseldorf, 19 Aug 92 (HANDELSBLATT)—Against the backdrop of talks on the competitiveness of German and European firms, Minister of Economy of Niedersachsen Peter Fischer has come out emphatically for a reorientation of the right to compete.

In an interview with HANDELSBLATT, the SDP [Social Democratic Party] politician stood up to SPD politicians emphatically in favor of strategic alliances in European industry, maintaining that a sensible competition policy must facilitate the incorporation of German and European industry into competitiveness on a worldwide scale.

We must not overlook the fact that German industry competes with Japanese and American companies that are much larger, financially stronger, and globally oriented. Fischer, who is chairman of the Federal and State Committee for Structure, Technology, and Industry Policy established in the fall of 1991 by the Ministers of Economy Conference, stressed the fact that the German and European competition policy must be fully aware of

the global dimension of competition. High technology markets can today no longer be penetrated by going it alone. The high cost of research, development, production, and marketing as well as the growing globalization of markets forces companies to cooperate more closely with one another precisely in the domain of research. Without strategic alliances, European industry cannot keep pace.

Fischer referred to the fact that, despite German industry's favorable competitive status in the fields of mechanical engineering, electrotechnology, and chemistry, there are considerable weaknesses in important key technologies. This is especially true with regard to microelectronics and consumer electronics, new materials, software products, and biotechnology. The lag in microelectronics is also jeopardizing Germany's market status in those sectors in which it has up to now still played a leading role.

In the past, major projects were taking up the Research Ministry budget to a growing extent. In the process, grants were concentrated on a relatively small assortment of particularly costly technologies that were high-risk with respect to economic success. The goal, to become competitive with the United States in the 1960s and 1970s in the field of mainframe computer installations through massive state aid, was not achieved. The manufacturers of small and medium-sized computers, who received relatively less aid, chalked up considerably greater successes.

Fischer criticized the fact that the technology policy of the past was in many cases a policy of subsidies for special projects owned by large combines. It did not help key sectors of German industry to retain their international competitiveness. The separation of functions between the Ministry of Economy and the Ministry of Research did not pay off. Fischer argued emphatically for a merger of both ministries to secure the integration and coordination of economic and technology policy measures.

The SDP politician sharply criticized the "competence of the federal government," which he certified to be "unfit to deal with economic policy." Policy has an important role to play in the safeguarding of competitiveness. Many political dimensions of influence professed to be relevant are not included in business firms' calculations. But they are of considerable importance for the conditions that determine our standing. The accumulation of various ideas and plans with regard to the burden of costs has a particularly deleterious effect on the industry and the whole economy. Neutral ways of financing expenditures for the protection of the environment and social security must be guaranteed in the laws governing them that are now on the agenda.

In the SDP politician's opinion, political dialogue ought to serve to discuss the different standpoints on the economy, social, and ecological challenges of the future and to reach a consensus on the goals for these issues. The collaboration of the state, the economic sector, and the science sector on Japanese policy is one of the keys to Japan's success.

"The political sector discusses and formulates their visions in close cooperation with the economic and science sectors. Consequently, economic policy objectives represent more something like the prevailing opinion of the political and economic sectors and their translation into actions; they are less a question of being able to assert oneself through power politics rather than a question of a purposeful division of labor between the state and the economic sector."

But, against the background of talks on the competitiveness of the German economy, Fischer also appealed to business firms to assume personal responsibility. Based on two different studies, it follows that two-thirds of Japanese competitors' cost advantages are to be attributed to a greater willingness to take risks, better management and organization methods, and relations between manufacturers and the supply industry. European managers have to begin to look for the answers [to their problems] in precisely these areas. Not an extreme division of labor and exact hierarchies, but integral operations, the integration of decentralized, independent units, and extensive abandonment of hierarchies form the foundation stone of a successful industrial company. Therefore, the first priority is the need for the industry to rid itself of its shortcomings. In view of the increasing globalization of competition, firms must learn to combine long-term planning with short-term flexibility.

Riesenhuber Argues for Closer Economy-Industry Collaboration

92WS0784C Duesseldorf HANDELSBLATT in German 21-22 Aug 92 p 6

[Article by B.A.G.: "21st Century Technologies: Riesenhuber Calls For Integration With Industry"]

[Text] Bonn, 20 Aug 92 (HANDELSBLATT)—Minister of Research Heinz Riesenhuber will be spending DM260 million this year on the search for the "technologies of the 21st century." The CDU [Christian Democratic Union] politician explained that the goal is to ensure the competitiveness of the economy in ways that spare the environment and resources. Industry and the economy are not yet, however, closely enough integrated to implement the new technologies.

In Riesenhuber's words, the Research Ministry's (BMFT) long-term planning should guarantee that the opportunities afforded by the new technologies, such as nanotechnology, biotechnology, or the science of materials, will be utilized. The general objective in this is to facilitate economic growth without commensurately increasing the consumption of resources.

A committee of experts on "research policy visions" is to determine which of the many new technologies our

industrial society actually needs. The minister emphasized that changes in the age structure of the society and protection of the environment must in particular be considered. The Fraunhofer Institute for System Technology and Innovative Research is currently exploring how technologies may be expected to evolve in the future for the BMFT.

Technologies of the Future on Interfaces of Disciplines

Riesenhuber pointed out that funds for new technologies were disproportionately increased this year with an allocation of 6.5 percent of the total ministry budget of DM9.3 billion. This tendency will continue over the next few years.

The CDU politician explained that the technologies of the future will especially be developed in "the border areas between physics, chemistry, and biology." He cited as an example nanotechnology, through which the smallest components are constructed. It may replace microelectronics as a key technology in the next century. By way of example, one possible application of it is the implantation of mini-insulin pumps in diabetics, Riesenhuber said.

In adaptronics, materials are developed that independently react to external influences. As examples, the minister mentioned window panes that turn lighter or darker depending on the amount of sunshine and airfoils or hydrofoils that automatically adapt to currents and even repair minor damages themselves.

New types of carbon molecules, the so-called fullerens, are harder than diamonds and can be used in many different ways. At low temperatures they become superconductors and, in addition, he sees the possibility of using them to develop light batteries as well as new semiconductor materials.

Natural Materials Copied

He cited photonics as another key technology, through which data are stored by means of light and transmitted at the speed of light. Nature is the model for the science of materials, by means of which scientists would like to copy high-quality materials like mussel shells, sea-urchin spines, or spider's webs. Riesenhuber explained that a stalk of grain, for example, is a "miracle of stability."

Also based on biology, in biosensorics they are working on high-tech sensors that should be able to detect the slightest traces of toxic substances or nutrients. In practice, they could determine blood sugar and blood fat values.

ESPRIT CIM Technology Offers Boost to High-Tech Industry

92WS0789D Brussels XIII MAGAZINE (News Review supplement) in English No 3, 92 p 6

[Article: "ESPRIT Technology Offers Boost to Car Industry"]

[Text] ESPRIT has just announced the successful completion of project 2277. This aimed to develop CIM for multi-supplier operations in order to improve the competitiveness of the European automotive industry. It concentrated on the application and development of methods, tools, interfaces and architectures to facilitate the exchange of technical and commercial data between independent organizations. The project started in December 1988 and ended in February 1992.

Unlike the Japanese automotive industry, where vehicle manufacturers and their major suppliers are members of the same 'family' and are in close geographical, proximity, the European equivalent comprises distance and independent companies, within supply and distribution chains, each with their own objectives. The project took account of existing system environments, emerging international standards and advanced concepts for production logistics in order to allow a smooth migration towards the CMSO solutions.

Expected benefits include a reduction of the product introduction time, shorter delivery lead times, reduced costs, lower stocks and improved product availability.

The results of this project can be used in a variety of areas, including developing new hardware and software products, strategic guidance, offering technical guidance for implementation, training and education, and input to standards and other technical and business organizations.

Although early development will be concentrated at project partner sites in the automotive industry, it is expected that many results will be applicable in other supply-based industries. The software systems (CMSO-Box) developed to handle specific business processes are already used at industrial partner sites.

The most important results achieved are a set of software packages; ILPW—Integral Logistics Planning Workstations, a PC-based planning workstation with a graphical user interface (for vendor rating, transportation and goods receiving planning, material flow planning and short term production planning); CMSO-Box for Manufacturing Logistics, a modular multi-layer EDI server (for transmission of standard EDI messages and customer order processing); CMSO-Box for Product Development, a second modular multi-layer EDI server (for transparent CAD, CAQ, BoM and other engineering data exchange and the handling of inter-organizational engineering processes); Logistics Chain Simulator; Supply Chain Methodology, a methodology to improve the performance of the network; Integrated EDI Architecture and Layer Shell System, a reference architecture defining the interfact skeleton and handling of a CMSO-Box with a software realisation called Layer Shell System; Natural Language Interface and Engineering Expert System, an approach to show the future of diagnosis and failure analysis systems in the repair shop.

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EC Commission Vetoes Belgian Aid to Siemens

92WS0789F Brussels XIII MAGAZINE (news Review supplement) in English No 3, 92 p 17

[Article: "Commission Takes Negative Decision on Belgian Aid to Siemens"]

[Text] The Commission has taken a negative decision against aid in the form of subsidies of BFr256.445 million (ECU6 million) awarded by the government of the Region of Brussels to Siemens AG. The aid was granted for the purchase of equipment leased to clients, as well as to fund publicity campaigns and market surveys. The Belgian authorities have been requested to recover BFr227.751 million (ECU5 million) that had already been paid to the company. This decision is the result of the investigation opened in July 1991 in respect of 17 awards of subsidies totalling BFr335.980 million (ECU8 million) awarded by the government of the Region of Brussels under the general aid scheme established by the Economic Expansion Law (EEL) of 1959. The aids had not been notified to the Commission.

The subsidies were granted to assist several expenditure programmes of Siemens SA concerning items such as data processing and telecommunications equipment brought for internal use; development costs of software; training costs; building acquisition; publicity campaigns and market surveys.

After detailed examination of the aided expenditure programmes, the Commission came to the following conclusions:

—Aid of BFr77.294 million granted towards investments of Siemens SA in equipment for internal use and in building acquisition was legally awarded within the limits authorized by the Commission for the operation of the EEL; accordingly, the Commission has no further comments on these aids.

—The aid of BFr2.241 million towards expenditures in training costs was illegally awarded in breach of the provisions of article 93(2) EC since such expenditures are not eligible for aid under the EEL; however, after examination of the aided programmes, the Commission has decided to approve the aid in view of its generally favourable attitude towards training aid.

—The aid of BFr256.445 million towards expenditures in equipment leased to clients, publicity campaigns and market surveys, was illegally awarded in breach of the provisions of article 93(2) EC since such expenditures are not eligible for aid under the EC; moreover, after detailed appraisal of this operating assistance to Siemens AG, the Commission has concluded that it does not meet any of the conditions which must be fulfilled in order for aid to be compatible with the common market. The Commission therefore took a negative decision on this point of the aid and has requested the Belgian authorities to recover the aid from the company.

French Government To Restructure CEA

92WS0795C Paris L'USINE NOUVELLE in French 27 Aug 92 pp 14-15

[Article by Jean-Pierre Gaudard: "The Government Prepares an Extensive Reform of the Organization: Trouble Around the CEA [Atomic Energy Commission]"—first paragraph is L'USINE NOUVELLE INTRODUCTION]

[Text] The reappointment of Philippe Rouvillois as the head of the CEA did not solve anything. On a background of budget austerity, the research organization will be invited to refocus on the nuclear sector. A new status is also under consideration.

The government's reasoning is surprising. The reappointment of Philippe Rouvillois as general director of the CEA, last 1 July, put an end to rumors of his fall out of favor. But the status quo was maintained only in appearance. All through the summer, ministers' staffs and supervising administrations debated the future of the CEA, with severe criticism of the Rouvillois management as their premises.

True, for a good 10 years the CEA reform project has resurfaced on and off in ministries. But the public trial of the last few weeks is causing some emotion among the CEA's 19,000 researchers and employees. The interruption of nuclear tests, the forced alliance between Thomson and CEA Industrie (strongly jeopardized since then) and, more recently, the refusal to authorize the restart of the Super-Phenix reactor, were already viewed as repudiations.

In the fall, the CEA general director will receive a letter of mission based on a joint report by Claude Mandil, general manager of energy and raw materials at the Ministry of Industry, and Bernard Decomps, general manager of research and technology at the Ministry of Research. On a background of budget austerity, the CEA will probably be asked to diversify less and be a little more strict in its choices.

But the review soon turned into a challenge. Through the impetus provided by the Ministry of Research, where technical advisor Didier Holleaux is in charge of the case, the redefinition of the CEA missions soon became an attempt to recast the organization and its operating methods.

Thus, taking advantage of the forthcoming departure of Guy Paillotin, assistant general director, the management structure might be altered, with the installation of a president (probably Philippe Rouvillois) and a general manager, the latter being given genuine management power. A draft decree providing for an extensive reform of the CEA status, which is still governed by a 1945 order, was even prepared.

Poor Image

The polemic focuses on non-nuclear research at the CEA. At the Ministry of Research, people do not hesitate to point to the "fuzzy" or "undefinable" image projected by the CEA, which they claim is unable to make difficult budget decisions.

Whereas the Mandil-Decomps report seemed to advocate looser links between the CEA's various directorates in order to promote cooperation with other research organization and a rationalization of CEA programs, the draft decree, in its initial version, was far more strict: "The CEA," it indicated, "may engage in technological research in fields where it possesses unique expertise." The replacement of the word "unique" by "specific" in a later version did not alter the restrictive outlook of the text.

These radical assumptions—which also involve changing the legal status of the CEA by turning it into an industrial and commercial public institution, transferring supervision over it from the prime minister to the Ministries of Industry, Research, and Defense, and taking the ISPN [Nuclear Protection and Safety Institute] completely out of it—owe much to the summer zeal of ministerial staffs. They portend no good for the research organization.

In recent years, the CEA was particularly ill-treated when budget decisions were made. In constant francs, state civil and military contributions were cut back one fourth since 1985.

The reduction of military credits and the suspension of nuclear tests caused the Directorate of Military Applications to take back many tasks that it used to subcontract to the CEA civil sector. Problems in the civil nuclear sector and the shutting down of Super-Phenix could soon have repercussions on research programs. Finally, receipts from outside (licenses to Cogema [General Nuclear Materials Company] or Framatome [Franco-American Nuclear Construction Company], contributions from industrial partners in the nuclear sector, sale of research to the industry), which account for over one third of the CEA civil budget, will tend to diminish in the near future.

Rather than ministerial ukases, budget austerity increasingly forces the CEA to undertake its non-nuclear research jointly with partners. Seventy-two percent of the Directorate of Material Sciences' budget are spent on international cooperation programs that require heavy equipment, such as the ESRF [European Synchrotron Radiation Facility] currently being built in Grenoble. Already, one half of the Directorate of Material Sciences' projects are completed jointly with the CNRS [National Center for Scientific Research], people at the CEA point out. The same approach is used for life sciences with, for instance, the creation of the new Structural Biology Institute in Grenoble, founded jointly by the CEA and the CNRS. As for electronics, "who will finance the LETI [Laboratory for Electronics and Data Processing Technologies] if we don't?" a CEA official asked.

Because of its multiple cooperation agreements, the CEA concentrated its budget cuts, at least in the non-nuclear sector, on its own research programs. Some teams had their equipment budget cut back 20-40 percent, to such an extent that they could no longer work normally. At the Directorate of Life Sciences, researchers were still recruited this year, but investments decreased by 47 percent. "The CEA management did not make its own choices," a researcher accused. "For many of us, the structure—CEA or not—is less important than the resources allocated to our programs."

Even in the nuclear sector, the CEA will have to break out of its splendid isolation in years to come. Its inventory of some 40 civil nuclear reactors, estimated at Fr20 billion, is largely obsolescent. It can be modernized only through cooperation agreements. If it is modernized at all.

Actually, politicians seem to have lost their blind faith in the atom. For some time, all decisions made have gone against the nuclear lobby. Last week, Segolene Royal, the environment minister, even challenged one of the last credos when she criticized the reprocessing of foreign spent fuel at La Hague plant. At the Ministry of Research, people also whisper that it might be preferable to store spent fuel "as is."

Atomic Energy Commission. The name may become hard to bear.

[Box, p 15]

Research in All Sectors

1992 CEA Civil Research Budgets (Millions of Francs)

Nuclear Sector	**4,706**
Fuel cycle	1,683
Nuclear reactors	1,419
Protection, safety	1,287
Dismantling	126
CEA-waste treatment	191
Non-Nuclear Sector	**3,540**
Material Sciences	1,638
Advanced technologies: electronics, computers, robotics, etc.	1,427
Life Sciences	475

France To Reduce 1993 Research, Industry Budget

92WS0795D Paris L'USINE NOUVELLE in French 27 Aug 92 p 15

[Article by Henri Loizeau: "Industry and Research Not Among Government Priorities; The 1993 Budget in Times of Austerity"—first paragraph is L'USINE NOUVELLE introduction]

[Text] Lack of economic recovery, declining tax revenues, increasing unemployment, etc. Drawing up the budget has never been as hard.

The priority to industrial voluntarism announced by Edith Cresson's government petered out. Pierre Beregovoy ignored the subject in his general policy speech following his appointment as prime minister. The 1993 draft budget will confirm the present government's near total lack of interest for what the 1992 finance bill then called "industrial priority." There is no longer any question of priority today. The Ministry of Industry, like the Ministry of Research and Space and nearly all ministries, will be put on a straight diet.

The "ceiling" letters that Pierre Beregovoy sent to his ministers at the end of July are perfectly clear. Only four ministries will be spared budget austerity: National Education, Justice, Employment, and Interior. All other ministries—with an average increase of no more than 1 percent—will have to consider reducing their expenditures before any other objective. The overall budget increase must not exceed 3.5 percent, hardly more than the expected 2.8-percent inflation rate.

No socialist government has ever had so much trouble to prepare its budget; 1993 being an election year, Pierre Beregovoy and his team are on the spot. The economic recovery announced first for the end of 1991, then for 1992, has not materialized yet. Worse, many experts no longer even dare expect it before the fall of 1993. The French economy, therefore, was not in a position to take advantage of a constantly announced recovery that never came. The fact that inflation is well-contained, the confirmation that production costs are under control, and the recovery of foreign trade weigh little against the unavoidable rise in unemployment. And precisely when political as well as economic conditions would call for an additional effort to increase social expenditures and strengthen the industrial apparatus, the government sees its tax revenues collapse.

Little Room to Maneuver

The budget deficit, initially set at less than 90 billion French francs [Fr] for this year, exploded long ago. A study of the State Deposit Bank estimated it at Fr165 billion. Containing it to some Fr150 billion (2 percent of the gross domestic product) in 1993 would obviously be a most pleasant surprise. As the debt burden increases, the government will have proportionately less room to maneuver. The Ministry of Research and the Ministry of Industry will therefore bear the brunt of increased budget austerity. Hubert Curien and Dominique Strauss-Kahn will have to expend boundless ingenuity to make their budget look good. Turmoil around CEA research (see above article) will not conceal the inadequacy of the credits allocated to large research organizations. At the Ministry of Industry, people still want to believe that the austerity announced by the prime minister will be somewhat relaxed by mid-September so as not to cause despair among small and mid-size businesses and industries, which are waiting for the second instalment of the plan around which Edith Cresson mobilized them last year, when she though she was in for the long haul. But on the eve of high-risk legislative elections, the industrial imperative might well be sacrificed in an attempt to win back public opinion.

RACE II Focuses on Optical Transmission Technology, 3-D Presentation

92WS0796C Duesseldorf VDI NACHRICHTEN in German 14 Aug 92 p 9

[Article by Richard Sietmann: "Broad-Band Communication Geared Toward Pilot Applications"; opening paragraph is editor's lead]

[Text] The EC's RACE program has a clear industrial policy goal: strengthening the competitiveness of the European telecommunications industry, network operators and service providers. Advanced services are to be offered to users, and these in turn will solidify their competitiveness. The second phase of the program initiated in 1985 is now underway.

The pun on the program's name was strictly intended by its creators with regard to the world market: RACE refers to the English word, and the abbreviation stands for "Research and Development in Advanced Communications Technologies in Europe." Its declared goal is the introduction of integrated broad-band communication (IBC) in Europe while taking national strategies into account, particularly the ongoing introduction of ISDN.

Roland Hueber, director of the XIII/F divison of the EC Commission in Brussels responsible for RACE, emphasizes that "one of the implicit goals is the claim to help overcome the deep-seated fragmentation of European telecommunications traditions." Central concerns of the individual projects, numbering 100 in all, are IBC developments, network management systems, mobile radio, image and data transmission, security technology, experiments with new kinds of services, and the setting up of test infrastructures. In each of these areas the interest ranges from system technologies, synchronized working packages, key technologies and component development to their integration into demonstration projects.

In general, pre-competitive research and development cooperation is encouraged. A prerequisite is that the project participants come from different Community states and that system producers, network operators, service providers and research and development foundations work together. That the desired synergies really

can be summoned up is shown by a glance at the list of participants, which includes every reputable company and research foundation.

By comparison to the first phase of the program, RACE I, the accent has definitely shifted in RACE II. Whereas previously the exploration of technical options was in the forefront of activity, now it is function specifications in the approach to standardization, implementations and pilot applications.

An outstanding example is coherent optical multichannel transmission (CMC). In RACE I such a demonstration plant for cable TV distribution had been started up in the region of the participants as Project R1010. Participants in the project were the firms of Philips, GEC Marconi (formerly Plessey) and Siemens, along with three research institutes. CMS systems are second-generation transmission systems. Instead of the digital pulse sensors with intensity modulation and direct detection (IM/DD) common today, they are based on the coherent properties of light waves and can exploit the transmission band width of glass fibers, estimated at at least 30,000 GHz, very much better with digital frequency modulation of the optical transmitters and high-discrimination reception.

While IM/DD systems make more transmission capacity available merely through enhancement of the data rate to the multi-gigabit level, which produces corresponding problems with the multiplex hierarchies, with coherent multi-channel technologies—at least in principle—approximately 3,000 channels at 2.5 Gbit/s each can be placed on a single glass fiber with a channel separation of 10 GHz, which means a total transmission capacity of 7,500 Gbit/s. The necesary CMC components for sender and receiver, including synchronizable semiconducting lasers, have already been developed and tested.

Now with the follow-up project, R2065, COBRA, the step to practical pilot applications is going to be taken. Three field experiments are planned: for video conferencing in Portuguese telecommunications, for flexible networking of business centers in Dutch telecommunications, and for the construction of self-dial network for the transmission of digital TV systems between the studios of the BBC. On the German side, Siemens AG and the Heinrich Hertz Institute in Berlin are participating in these projects.

COBRA occupies a key position in RACE II, for the significance of these projects goes far beyond the demonstration that multichannel technology is ready to be implemented. The future network structure for integrated broad-band communication will have to be open to second-generation systems. The important question of upward compatibility has already been given a positive answer, at least with respect to technology.

No less revolutionary than COBRA for transmission is Project R2045 for electronic imaging technology. The project "Digital Stereoscopic Imaging and Applications" (DISTIMA) has as its goal three-dimensional, steroscopic image presentation for professional applications. This could apply to medical imaging procedures for diagnostic purposes, to construction technology and to industrial quality control. Under the leadership of Siemens, a total of 13 European companies and research institutes are participating in this project.

The components of the hardware are conceived as being a camera and an LCD display which will make looking at three-dimensional images without optical aids, i.e. without stereo glasses, possible. The conclusion of the project will be a functional prototype for pilot applications which permits image transmission via the broad-band network in real time and with microelectric components.

[Caption] Very delicate glass fibers can transmit enormous amounts of information. New transmission technologies are now to be tested to discover whether they can be used for videoconferencing or for digital TV images.

The RACE Scenario [Box]

1993: First introduction of applications, mostly for professional users. Experiments with new services on existing networks and protype versions of installations for integrated broad-band communication (IBC). Decisions on creation of pan-European networks and services.

1994: Linkage between all main centers of the EC and neighboring countries. Optical long-distance networks take over voice, data and image traffic either separately or as integrated services.

1995: Beginning of IBC network implementation and completion of business participant linkages in the Community centers. Linkages exist for at least 50,000 corporate clients.

1996: Simple commercial broad-band services to be offered on the basis of 2, 34 and 155 Mbit/s linkages, coupling of local glass fiber networks. Linkage of IBS, satellite and mobile radio networks.

1997: Connection to IBC offered for business participants in cities of more than 500,000 inhabitants. Beginning of service for ordinary customers. Further linkage of IBC islands in the optical long-distance network.

2005-2010: 50 percent market penetration with IBC connection.

IRDAC on Strategic Fundamental Research in EC's Fourth Framework Program

92WS0807C Brussels IRDAC NEWS in English Jul 92 pp 4-6

[Article: "IRDAC Opinion on Strategic Fundamental Research"]

[Text] On 29 June 1992, Mr. Yves Farge (IRDAC Chairman) transmitted IRDAC's Opinion on "the role of the Community in the field of strategic fundamental research" to Vice-President Filippo Maria Pandolfi, Commissioner responsible for Science, Research and Development, Telecommunications, Information Technology and Innovation, Joint Research Centre. In this opinion, IRDAC has two major messages for the Commission:

A. Europe cannot afford to neglect leading edge technologies at the frontier of knowledge, which will determine major developments of the whole economic fabric. The Community should therefore launch, in addition to national activities and if necessary at the expense of non-strategic research domains in the Community budget, a specific initiative on strategic fundamental research (i.e. basic research relevant to major industrial and societal needs and demands) within its Fourth RTD Framework Programme. The objective is to stimulate and improve the quality of fundamental research implemented at European research institutes, so as to creating the environment in which young scientists can be educated at the frontiers of science and technology. This initiative should be focused on "small hard sciences" like main stream physics and chemistry, mathematics/statistics, basic engineering sciences, nano-technologies, etc.

B. In the context of this initiative, the Commission should not contribute to the creation of new "centres of excellence" for strategic fundamental research, but strengthen the potential of existing research institutes to become real centres of excellence through an open competition at Community level between concurring research teams, for extra Community support. The principal basis for ranking should be peer reviews with a significant industrial involvement at European level, supported by complementary mechanisms to avoid too strong conservatism.

Since its beginning, IRDAC has stressed the need for Europe to dispose of a strong scientific research base, essential both to develop the flow of ideas which can feed into products and processes and to ensure that Europe has a sufficient supply of qualified scientists and engineers. In its Opinion of April 1989 on the Commission's first report on the State of Science and Technology in Europe (*) IRDAC stated: "The strengthening of the scientific research base is essential to improve Europe's competitiveness. There is insufficient research carried out in Europe, compared with our major competitors. In particular, fundamental research in technological disciplines receives too little attention in most Member States and there is a need to redress this imbalance. Stable support for gifted individuals and small teams is of the utmost importance to maintaining the quality of the science base; good networking will be necessary to cope with multidisciplinary problems rather than large centralized teams."

Following a request by the Commission, IRDAC discussed on 6 and 7 March 1992 with Mr. Pandolfi the future Community strategy in the field of research and technological development (RTD), in order to formulate suggestions which could be included in the Commission's considerations concerning RTD policy after Maastricht. The results of this exchange of views were put down in IRDAC's Strategy Paper (**) transmitted early April to the Commission. Again, IRDAC underlined the need for a correct balance between support for industrial RTD programmes and support for the science base, and committed itself to provide more specific advice as soon as possible.

On 27 May, an IRDAC Round Table discussion was organized on the topic "Strategic Fundamental Research" under the chairmanship of Dr. Harry L. Beckers, former IRDAC Chairman.

Twenty-five distinguished persons from industry and academia (***) participated in this exchange of views, the results of which were summarized in the form of a draft IRDAC Opinion. In June 1992, the participants in the Round Table and the members of IRDAC approved the final version of this paper. The main ideas developed in this IRDAC Opinion on the role of the European Community in the field of strategic fundamental research (****) are as follows:

1. Europe needs a strong fundamental research base at universities and other public institutions of research and higher education with free access for everyone, as the environment in which students and graduates are educated at the frontiers of science, in order to:

- maintain the competitive edge in most sectors of industry;
- ensure a sufficient supply of qualified scientists and engineers;
- provide new knowledge of highest quality and underpin the flow of ideas which could feed into industrial products and processes;
- attract scientists of highest reputation to carry ahead the frontiers of science;
- contribute to the denouement of many of the global problems facing the world of today;
- contribute to the refreshment and extension of the worldwide reservoir of knowledge (all countries profit not only from their own research, but even more so from the vast amount of research done elsewhere).

2. In line with the principle of susidiarity, the Member States or their regions bear the responsibility for the organization and health of their education and research systems. These systems are quite different and present one of Europe's intellectual wealths. In most of the Member States, publicly-financed research cannot keep up with the fast growing demand for university education, and fundamental research has shifted to some extent to the non-educational research institutes. Fundamental research has in this sense lost some of its significance in the national education systems, even if research

at specialized institutes contributes indirectly to the supply of skills. One wonders if the original idea of education at the frontiers of science is still relevant or even possible from a financial point of view, for all universities or all courses at a specific university. Moreover, some experts consider that European science and research is no longer able to match worldwide excellence in certain fields of fundamental research or is even losing relevance in some strategic areas. In addition, fundamental research financed by public authorities is—to varying degrees—not enough focused to urgent societal needs and demands.

3. IRDAC believes that it is the duty of the Member States (or their regions) to guarantee the basic financing of their universities and institutes and that new methods and instruments will be developed to ensure that the overall performance of the different national systems is increased. There is a rather wide-spread feeling that the organization of many European universities is not responding to the principles of modern management. The major branches of the European industry have a complementary role to play, and there are a number of convincing examples of traditionally fruitful relationships between industry and universities (as well in Europe, but above all in the United States) which could serve as a model for larger application.

4. In IRDAC's opinion, the following specific factors are also responsible for the very often marginal performance of European fundamental research compared to non European centres of excellence:

- not sufficient scientific competition, at the European and the national levels, between universities, research institutes, and scientists, caused by the European tradition of life-long academic careers, success-independent funding or, in the smaller countries, by the uniqueness of research teams, leading to a certain self-complacency;
- lack of sufficiently strong incentives to reach excellence;
- compartmentalisation of the European scientific research landscape and difficulty to overlook and understand its functioning.

5. Few additional financial resources, if at all, can be allocated to the European overall fundamental science and research system, in the present period of stringent budgetary limitations. Its deficiencies have therefore to be overcome, first of all, through higher quality, greater efficiency, better management.

6. IRDAC is convinced that the Community has to play an important complementary role in the development of strategic fundamental research (fundamental research needed for important societal needs and demands). This role should be developed on the basis of the present work inscribed in the Third Framework Programme. IRDAC recommends a complementary initiative in the field of strategic fundamental research—if necessary at the expense of non-strategic research domains in the Community budget—encompassing the following actions:

- Improvement of the quality of high and average level fundamental research by creating a competition for extra support at the Community level. This additional support could serve in part to engage young researchers in front rank work, thus compensating for the present prevalence given, in assigning grants, to tenure and seniority.
- Stimulation of priority areas through the creation of a specific Community programme on strategic fundamental research or through increasing the percentage of funds dedicated to fundamental research within other research programmes (adapting at the same time the access rules: in certain cases for instance, the present request for transfrontier cooperation does not enhance the efficiency of work);
- Stimulation of the cooperation between working groups and enhancement of interdisciplinary fundamental research between institutes in different Member States; the "Schwerpunkt-Programme" of the German DFG might serve as a model;
- Stimulation of prelegislative fundamental research;
- Peer reviews (excluding those experts having a personal interest in the matter) with a significant industrial involvement at a European or even larger level, which should be the principal basis for the ranking (quality) of fundamental research projects to be supported (but additional mechanisms and criteria are necessary, to avoid an excess of conservatism);
- Special measures to assist particular institutes and working groups to attract top-level scientists and the most talented post-graduate researchers;
- Better diffusion of research work and results to spread knowledge and to prevent unnecessary multiplication of work, through:

—Community-wide networks of scientists working on a specific subject;

—the creation of focal points for national science and research bodies;

—better access to international libraries;

—translation of articles published in languages not easily accessible;

—stimulation of the development of the potential of existing organizations such as the European Science Foundation, to play a European role within the field of fundamental research.

7. Fundamental research implemented with the involvement of the Community is suited to automatically strengthen the prestige of the participating research teams. This effect of credit and reputation leading to higher quality of research could be enhanced through the granting of awards of excellency to individuals or teams, or even through setting up bold grand-scale targets challenging the scientific community.

8. IRDAC does not believe that the Commission should support the creation of new "centres of excellence." On the other hand, high levels of competence already existing at universities or other research institutes of all Member States should be strengthened to become generally accepted centres of excellence, and teams having the potential to develop in that direction should be stimulated, through an open competition at Community level between concurring research groups, for Community research grants and other incentives having the same effect.

9. Strategic weaknesses or special strengths in Europe should be identified by a concerted process involving the Community and the Member States. Such priority areas in fundamental research should be eligible for receiving Community support. In this context, IRDAC underlines the need to compare the relative efficiency and cost-effectiveness of training people for useful skills through "big science" (astronomy, particle physics, etc.) and "small science" (chemistry, mainstream and solid-state physics, biology, mathematics/statistics, basic engineering sciences, nano-technologies). However, a substantial part of non-directed work in basic science should be maintained and encouraged both at the European and national levels.

10. Sustainable development, especially in the field of environment, is one of those broad themes to which strategic fundamental research is relevant, and the problems of developing countries are certainly among the priority areas to be considered in this context. Also, Europe cannot afford to neglect leading edge technologies at the frontier of knowledge, which will determine major industrial and societal developments, concerning the whole economic fabric comprising many traditional sectors (e.g. engineering, machine tools, consumer goods, textile, clothing).

(*) See IRDAC NEWS N' 5, June 1989, pages 1-3

(**) See IRDAC NEWS N' 17, April 1992, pages 1-5

(***) List of persons will be published in the next issue of IRDAC NEWS

(****) See under Documents of Interest

Germany: Growing Government, EC Support for SME's Microsystems Technology

92WS0813A Duesseldorf VDI NACHRICHTEN in German 28 Aug 92 p 3

[Article by Wolfgang Mock: "Top World Products from Small Companies: The German Federal Research Promotion Program Seeks New Prospects for Microsystems Technology"]

[Text] ***VDI-N, Duesseldorf, 28.8.92—Microsystems technology is considered one of the key technologies for the coming years. By means of an ambitious promotion program, the German federal government has catapulted German industry and research into the forefront of international competition. Now, the EC has taken an interest in microsystems technology as well.***

A small blue box, scarcely as large as two match-stick boxes, lies on the table, attached to a display unit. A slight pressure on the tabletop and the digital display goes into action. The small box can determine a change in the inclination of the tabletop of up to a thousandth of a degree.

Hans-Joachim Lilienhof, business manager of the HL Planar Company, and his colleagues, have worked on this inclination sensor for almost two years. The actual inclination sensor, in which the signal preprocessing is also integrated, is mounted in the small, blue box in a ceramic housing. Connected to it is a microprocessor, which controls communications with the periphery. HL Planar boss Lilienhof considers the microsystems technology to be at the highest degree of perfection. "We only have two competitors in the world and their products are substantially more expensive than ours."

Microsystems technology (MST) has been considered one of the greatest hopes of the German high-tech industry for just about two years. Hans-Peter Lorenzen, who is the responsible party for MST development in the Federal Research Ministry gives the following definition: "When sensors, signal processing, and actors can be combined in a miniaturized form of construction such that they can feel, decide, and react, we speak of a microsystem."

Experts in the field, like Herbert Reichl, a professor at the Berlin Technical University, expect microsystems technology to unleash an even more far-reaching revolution than the one set off by the development of the computer.

And this revolution is being nurtured in the Federal Republic mostly by companies like HL Planar with its barely 20 employees operating out of the Dortmund Technology Park. HL Planar is one of the almost 100 small and midsize companies that has been supported by the Federal Ministry for Research and Technology (BMFT) within the framework of the "microsystems technology promotion plan" for about two years. Research minister Riesenhuber has allocated more than 100 million German marks [DM] yearly to this program. So far it has been supported for four years (1990 to 1994). "However," project director Ulrich Brasche of the VDI-VDE Technology Center in Berlin believes that "it would make no sense to permit the support funding to expire at that time."

This view is also shared in the BMFT. Lorenzen hopes to receive a total of DM600 million in support funding after 1994 and an extension for another six years. He is also confident of the continued support of his superior Riesenhuber. The greatest potential obstacle is the current desolate BMFT budget.

Brasche observes that "thanks to these supporting funds, it has been possible to put together a research and industrial capability that can maintain a leading position in international competition."

Furthermore, the market has already recognized the importance of microsystems technology. Of the estimated DM30.6 billion that German industry has invested in information technologies in the past year, the Berlin Society for Innovation Research and Consultation (GIB) estimates that about 40 percent went into MST projects.

Even today the total economic importance of MST should not be underestimated. According to the GIB calculations, as early as 1990, about 12 percent of all industrial expenditures of German industry went into microsystems technology. More than 2,500 companies are active in this sector, from small ones like HL Planar right up in scale to Daimler affiliate Deutsche Aerospace and Siemens.

And that is only the beginning. Fine drives made of silicon elements, micromotors not thicker than a hair, silicon gripping arms that can capture bacteria, micropumps and valves, intelligent catheters and medical instruments that can be introduced into the body to avoid the need for expensive operations are already under development. "Just as at the onset of computer development," Reichl notes, "we can scarcely imagine the possibilities that this new technology has still to offer."

From the beginning the Federal Ministry of Research has supported "all sensible strategies that promote the competitiveness of our industry in this field," Lorenzen notes. A deliberate effort was made not just to support the most advanced processes and technologies like the integration of the entire microsystem—mechanical, electrical, thermal, logical, optical, and biological functions—on a single chip. Promotion was deliberately aimed at opening up the entire MST market. Lorenzen clearly recognized that "there was not a sufficient amount of business for just the most highly integrated systems."

It remains undecided as to the future approach. Of the DM200 million that the BMFT has to date pumped into MST, DM120 million was made available for industrial-oriented, indirect-specific promotion. Over 70 percent went to companies with less than 100 employees to facilitate the development of marketable microsystems up to the prototype stage. This manner of support has now been stopped. Until 1994, only funding for joint research will be available.

But it was precisely the indirect-specific promotion that helped the small companies to react swiftly to market needs. Brasche in the Berlin VDI-VDE Technology Center fears "that the applications-oriented side of MST support is now being somewhat neglected."

If the support for microsystems technology is extended beyond 1994, then applications-orientation should in any event lose some of its importance. In 1991 the Japanese launched a 10-year MST program with a comparable (¥10 billion) amount of financing, in which industry and the universities were to concentrate solely on the development of the underlying principles of MST, not on applications.

That is an alarm signal for scientists like Reichl: "We can no longer neglect these underlying principles. Almost all industrial branches will be even more strongly dependent on this technology than in the case of microelectronics." Brasche too adds: "We shall again open the window in the direction of researching the underlying principles somewhat wider."

To avoid being overrun by the Japanese again, the Germans are now also seeking cooperation with other European partners as well as the financial support of the EC Commission. Both the head of the Berlin Fraunhofer Institute for Microstructure Technology, Anton Heuberger, as well as the VDI-VDE Technology Center in Berlin and the Institute for Microstructure Technology of the Karlsruhe Nuclear Research Center have formulated proposals to the EC Commission. The automobile and aviation industries, the measurement, automation, and communications technologies, as well as medical and environmental technologies were singled out as potential major fields of application.

"What we need," says Juergen Gabriel of the VDI-VDE Technology Center, "is a European solution of the standardization problems and market-oriented research. Consequently, production technologies should have the highest priority."

Experts at the EC estimate that in order for the Europeans to retain their top position in MST, more than DM2 billion would have to be invested in such a program over a period of four years. But money alone is not the decisive factor in a technological competition with Japan. "In the final analysis," Lorenzen emphasizes, "it will be a matter of who uses this technology industrially."

German Politician, Researcher View Need for Technical Progress

92WS0821A Berlin ING DIGEST in German Sep 92 pp 12-13

[Interview with Bundestag member Christian Lenzer and Prof. Rolf Kreibich by Guenter Ludvik and Rainer Althaus for ING DIGEST: "Technology-Progress Yes—but..." Initial paragraph is ING DIGEST introduction]

[Text] The politician must take a position, the scientist wants to question. What will happen concerning the current situation in technology and economy? Bundestag member Christian Lenzer, research policy spokesman for the CDU/CSU [Christian Democratic Union/ Christian Social Union] Bundestag caucus, and future

researcher Prof Rolf Kreibich, director of institutes in that field in Berlin (IZT) and Gelsenkirchen (SFZ [Secretariat for Future Research]) provide answers.

[ING DIGEST] Mr. Lenzer, how can politicians support the technical development in view of the growing rejection of technology?

[Lenzer] In my opinion the latter doesn't exist. However, the politicians must be aware of their responsibility to explain even difficult technical circumstances in simple words to the population. Above all, it must be demonstrated that without technical progress the problems of the modern industrial world cannot be solved.

[ING DIGEST] But explanations by politicians and experts are often contradictory. How can one expect to have confidence in them?

[Lenzer] Confidence can be developed in politics primarily through consistent personal example. We must tell the citizens the truth as well as always stand behind our decisions. You achieve nothing with blustering and "hot air."

[ING DIGEST] It is not that simple with respect to technologies such as nuclear power utilization. A social consensus hardly seems possible.

[Lenzer] It is not always possible to achieve consensus in the democratic debate. This is normal, but must not lead to a moratorium on decisions. So to begin with I drive it home to my own friends that all technical and scientific circumstances must be carefully examined, external expertise included as well, and then what is determined as right should be politically implemented.

[ING DIGEST] Would you, if you believe in a direction for the development of research and technology, also want to take action to implement it even with slim majorities?

[Lenzer] Of course I would try to implement a decision which had been found correct and necessary even with nothing by a scant majority. Just as obviously I would also, of course, take responsibility for it in public.

[ING DIGEST] The Office for Evaluation of Technology Consequences of the German Bundestag has been in office for about a year now. Is it providing acceptable input for the policies?

[Lenzer] No other institution is ultimately able to relieve the freely elected parliamentarians of their decision. Attempts to undertake technological consequence evaluation therefore serve exclusively to prepare for this political decision. So it is more of an advantage and not a shame for the political process if it relies on external expertise in order to arrive at tenable solutions.

[ING DIGEST] Should there perhaps also be a committee which evaluates the consequences of politics, for instance laws?

[Lenzer] That should not be in contrast to the technological evaluation. In my opinion, the latter also includes—and that would largely be the political responsibility—what it means when certain natural scientific and technological developments are constantly obstructed by politics. For it means not taking advantage of certain opportunities.

[ING DIGEST] Do such opportunities also include for example shipping our own waste abroad and obtaining energy from there?

[Lenzer] It would be shameful if a highly developed industrial nation such as Germany were not capable of solving its disposal problems by itself. Of course, nothing argues against European cooperation. We are, after all, a densely populated country and for that reason have fewer possibilities for storage space, for example, than other partners. But initially we should try to solve our problems with our own strength.

[ING DIGEST] How do you rate Germany's chances of not falling behind in important technologies?

[Lenzer] As a country with few raw materials, we are more than ever relegated to peak technological and scientific performance. Of course, we cannot and should not be at the very forefront in every field. In certain key technologies such as microelectronics, biotechnology or materials research we should be competitive, in the interest of Germany as an economic and production location.

[ING DIGEST] Once again, this has to do with technology acceptance. Isn't that higher in the East right now?

[Lenzer] I believe that the conditions in both parts of Germany will very quickly adjust to each other. To be sure, at the moment it still appears as if there is greater acceptance of technology in the eastern laender. With progressive economic prosperity, however, the same manifestations will become apparent as in the West.

[ING DIGEST] Perhaps the present administrative structure of the state represents an obstacle to some decisions, for example to authorizations. Could one learn from Japan's MITI [Ministry of International Trade and Industry]?

[Lenzer] We should certainly beware of uncritical imitation of Japanese conditions. But what we can learn from Japan is to bundle all social forces toward goals which have been recognized as necessary and useful for the continued economic and social development of the country. This is not primarily a matter of money. On the contrary; it means that after the political opinion-forming processes one is also able to agree in social consensus on the joint tasks.

[ING DIGEST] Prof. Kreibich, in your opinion what is necessary for the economy and technology in the future?

[Kreibich] Future research, which I link closely to technology evaluation, can hardly provide prognoses about future global conditions. It can indicate the direction not to take, warn against what one should not do. It was precisely the politicians who interpreted the prognoses for previous periods totally wrong.

[ING DIGEST] So what is it above all that we should not do?

[Kreibich] Stick to our established, habitual activities, want to extend today in linear fashion into the future. We must deal with other worlds of life, with social and cultural matters beyond the economic and technical ones. We must get away from the consumer frenzy, away from the freeway ideology.

[ING DIGEST] But that sounds radical and has hardly any prospect of general acceptance.

[Kreibich] That is why orientations are necessary. Scientists and technicians usually have hardly any orientation knowledge. They often have very narrow professional thinking. Until now it was always thought that economic growth by itself is good and positive. When we take a closer look, we must recognize that it involves a destructive process, which in a catastrophic manner attacks the foundations of our lives: I am talking about economic armament.

[ING DIGEST] So it should be turned back?

[Kreibich] Yes, of course. In addition to the race to disarm in the military area, which has fortunately set in, there must now—it is my hope—be one in the economic field. The goal must be ecological management, avoidance of the present energy and material flows. A certain relief could already be achieved through telecommunication, that is to say through information flow. But in the end we must achieve consistent savings strategies worldwide, although primarily in the industrial nations.

[ING DIGEST] Why precisely in them?

[Kreibich] Because with only 24 percent of the world's population they consume 80 percent of the energy production, 12 times more per capita than people in the developing nations. For automobile traffic alone, Germans use as much fossil fuel as all of black Africa together in energy. This disparity cannot continue this way. The world summit in Rio showed that, depending on the branch of industry, the developed countries are responsible for 70 to 100 percent of the environmentally destructive factors.

[ING DIGEST] But to begin with, we will not stop making products.

[Kreibich] That is exactly the reason why we at least need reduction strategies, and when those are also over with it will be necessary to reuse parts or subsystems of our products. Valuable materials must be reused. We need a materials cycle economy, which functions with as much self-regulation as possible. This is difficult, but there are already many approaches to this through political and economic framework conditions. Who dared hope until quite recently that the federal government would even start talking about the energy tax? New patterns for progress, which are ecological, social and tolerable for future generations, must enter the heads of those who are responsible for technology and economy.

[ING DIGEST] A turnaround on the energy path, meaning priority for savings measures and renewable energy sources, a dissociation from the tie-in theory, according to which economic growth cannot be separated from energy consumption, full responsibility for the product, meaning for its packaging and waste disposal as well—doesn't that mean a completely new structure of values?

[Kreibich] Absolutely: It means that I closely link the quality of life to preservation of the natural foundations for life, from clean oceans to a variety of species of plants and animals. A reevaluation is simply unavoidable. But this requirement is exactly what stimulates innovations. Environmentally conscious management, energy-saving technologies, fully recyclable products will come, I am personally completely convinced of it.

[ING DIGEST] Will the consumers, will the majority of the people want this? Perhaps most are satisfied with an artificial world, a high-tech island in the desert?

[Kreibich] I cannot answer this very difficult question. I agree with Hans Jonas, who also capitulates in front of the question of how the human being would like to see the future world. At any rate, the experiments we are doing, all our projects for industry, are aimed at keeping nature the way we find it livable. But that is exactly why we need an enormous measure of engineering creativity, creative imagination. There are fascinating things, such as "growing small," microsystem technology.

[ING DIGEST] Is the demand for saving energy and raw materials also a part of your new global economy order?

[Kreibich] All countries must go down this path. It is very annoying that due to a certain impatience with respect to the upswing in the new laender we are making the same mistakes as in the western industrial nations. The industrial countries must show much more readiness to transfer know-how; ultimately, that benefits us all. But it also includes the fastest possible debt forgiveness for the developing nations, otherwise we will achieve nothing. People must get out of poverty, because that is the crucial reason for environmental sins. This is connected with the fact that raw materials and energy prices have to be raised—because only by doing that will utilization of solar energy become economical. In one phrase: We must abandon purely economic bottom lines for ecological ones.

Removal of Non-Nuclear Research From French CEA Proposed

92WS0825A Paris ELECTRONIQUE HEBDO in French 10 Sep 92 p 6

[Unsigned article: "CEA Electronic Research in Question"]

[Text] The CEA may find its non-nuclear theoretical and applied research curtailed by decree. LETI may come under CNRS authority.

According to the TRIBUNE, the Ministry of Research is said to have helped prepare a report and to be the source of a draft decree which may not be to the liking of Atomic Energy Commission (CEA) executives. This draft would favor autonomy for CEA's various departments and may force the institution, established in 1945, to relinquish its non-nuclear theoretical studies as well as part of its applied non-nuclear research. For electronics, this would be tantamount to placing the LETI research laboratory in Grenoble out of CEA jurisdiction, and under the CNRS. In 1992, the civilian research budget amounts to 3.54 billion French francs [Fr], of which Fr1.427 billion for electronics, computer science, and robotics, from a total CEA research budget of Fr8.246 billion. Asked to comment, the Ministry of Research characterized the suggestion that the CEA research activities would be dismantled, as "a crass and distorted view of things." For their part, CEA representatives are expressing the view that while measures related to cost reduction may be under consideration, there is no question of "upheaval." As for the CFDT federation of mines and metallurgy, it has already spoken out in favor of preserving CEA military and civilian activities, installing a permanent body to monitor research progress, and giving greater autonomy to the non-nuclear sector. In any case, and as our own investigation suggests, the personality of the person who will be picked as head of the newly defined CEA will play a decisive role (even within the framework of SGS-Thomson refinancing). He will be selected on the basis of criteria which are at present linked more closely to politics than to managerial qualifications.

Innovation by French Small, Medium Companies Called Insufficient

92WS0825B Paris SCIENCE ET VIE in French Sep 92 p 113

[Unsigned article: "Two or Three Things That Had to Be Repeated]"

[Text] The latest Technology Symposium provided an opportunity to restate a number of facts as well questions on the subject of innovation. We report them here unretouched, for your consideration and for immediate reaction.

Two-thirds of small and medium enterprise (PME) owners confess that they are not concerned with innovation. And yet more than one-half the products which will be on the market in 1997 do not exist as yet. PMEs which supply nearly one-half the jobs and one-quarter of our exports are currently contributing only 15 percent of the country's research and development spending. Forty percent of these PMEs have brought no innovations over the past five years and are not planning any for the next five years.

Technology is something more and something else than technique; it is also knowhow. It is the result of a joint effort between the researcher in his lab and the industrialist in his plant.

Two out of three enterprises who generate at least 30 percent of their sales from innovative products are export firms. And their exports have grown by 60 percent in five years compared to a 15 percent growth for other companies.

The most routine aspects of production also benefit from innovation: over the past 20 years, for instance, thanks to improved fabrication processes, concrete manufacturers have reduced their energy consumption by one-half.

Technologies are increasingly "diffusive," which means that they are likely to transform a good many other areas than the one in which they were initially developed. This raises a question: how to recognize these technologies and how to achieve the most broadly based "technology watch." And how is the latter to be funded.

While innovation is accelerating, so are its costs. It took a Fr500 million research and development investment to yield the new integrated memory which IBM will produce together with Siemens at Corbeil-Essonnes. The next generation will require a billion dollars, estimates the general manager of the IBM Europe technical services. The financing issue arises here again: where can such a sum be found? By forming European and international alliances? Or rather by depending on high-level fundamental research, on the availability of major national and international public research resources? As emphasized by Laurent Citti, head of research at Alcatel-Alsthom, "the existence of Europe must not eliminate national research programs. We don't do enough in France!"

Expert: France Needs to Import More Technology

92WS0825C Paris SCIENCES ET VIE in French Sep 92 p 115

[Unsigned article: "We Don't Buy Enough Technology!"]

[Text] This paradox is in fact the lesson that may be learned from the innovation explosion of the past 40 years. It has been noted in fact that one innovation creates another, and that exchanges of technologies with

the rest of the world trigger cross-fertilization through interdisciplinary techniques. What was "not invented here" must therefore be sought, is the conclusion drawn by Dominique F. Turc, professor affiliated with HEC and author of "l'Inevitable Partenaire Japonais." But France imports and exports 20 percent less technologies than Japan, one-half as much as Germany and 15 times less than the United States. Unless an absolutely revolutionary technology should appear (such as the steam engine or the semiconductor), the future belongs to those who know how to push the envelope on existing technologies, know how to exploit them, and how to combine them, according again to Turc. And to those who are also competent, needless to say, to create a social fabric where these three principles may operate and grow.

Turc's assertions appear sensible when you consider that the past to some degree portends the future, at least for certain trends which it highlights.

As a case in point, while technological revolutions are rare, we must unavoidably note that innovations do multiply at an increasing rate, and that they "come from the most part from either a combination of existing technologies, or from new possibilities offered by their development."

For those who want to ponder the current state of technologies and imagine their possible combinations and extrapolations, the telephone exchanges of the year 2010 are already predictable; in the same time frame, so is high definition television and the multitude of applications that will grow out of it in terms of communications and leisure; predictable also, for around the year 2020, is the end of automobile pollution. Why not then make use of this now? Some are already working on it, but for the most part they are in Asia...

German Economics Ministry Funds Research for Small, Medium Companies

92WS0827C Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 14 Sep 92 p 10

[Article by T.N.: "More Research Funds for Medium-Sized Companies"]

[Text] Frankfurt—The Economics Ministry has earmarked DM435.7 million for research and development in medium-sized companies for next year. DM353.5 million are being provided for the current year. In connection with this, the federal government is laying emphasis on specific sectors. Thus, DM190 million are to be earmarked for direct contributions to research in small and medium-sized companies in the new federal states, DM100 million of which for new research facilities closely related to the economy. Another DM180 million will serve to promote joint research in industry, especially joint industrial team research (AIF). Earmarked for the promotion of technology transfer are DM33.5 million. Aside from the Economics Ministry, the Research Ministry is also promoting research in small and medium-sized companies with about DM600 million. Through these aid measures, federal subsidies will come to a total of about DM1 billion next year. With an additional DM1.78 billion, the budget for the German Research Association (DFG), the joint federal and state organization for basic research, will show an increase of 10 percent next year. For 1993 the budget will be composed of DM970.8 million in current federal funds, DM708.2 million in state contributions, DM7 million in the DFG's own funds, and DM93.3 million in federal funds for special projects. Coming to DM57.1 million, the DFG's administrative expenses represent 3.2 percent of the funds it manages. In comparison with other public institutions, this is a very low percentage.

France, Chile Sign S&T Cooperation Agreement

92WS0831A Paris AFP SCIENCES in French 10 Sep 92 p 2

[Text] Paris—The French Scientific Research Institute for Cooperative Development (Bureau of Overseas Scientific and Technical Development, ORSTOM) and Chile's Comision Nacional de Investigacion Cientifica y Tecnologica (CONICYT) signed an agreement on scientific and technical cooperation 20 August.

According to the communique published 8 September, the agreement provides for the two organizations to conduct joint research programs and organize workshops and seminars on topics of shared interest. They will also collaborate on training and education and exchange scientific and technical information.

Five ORSTOM researchers are already working with Chilean universities through cooperation accords. The schools include the University of Antofagasta for geological research, the Catholic University of the North for hydrology research, and the University of Chile for geological, geophysical, and remote-sensing studies with application to agricultural soil science.

CONICYT is the Chilean organization responsible for orienting, harmonizing, and encouraging research and development in all the institutions that make up the country's scientific and technological system.

ESA Head Favors Russian Participation in Hermes

92WS0831B Paris AFP SCIENCES in French 10 Sep 92 pp 5-6

[Article entitled: "Hermes: Salvation in the East"]

[Text] Paris—The European Space Agency (ESA) is looking to the East to "speed up" implementation of its manned flight program, the Hermes spaceplane, prepare its astronauts for life in space, and still save the money it vitally needs to. It is going to propose to the space ministers of its 13 member countries that the Agency collaborate closely with Russia between now and the end of the century.

It is up to the "politicians" to decide on 9 and 10 November in Grenada, Spain. "In November, 1991, in Munich, member governments asked us to explore the possibilities for international collaboration, especially with Russia, in recognition of Europe's financial constraints," stressed Jean-Marie Luton, the ESA's general director. Mr. Luton gave an account 9 September of the proposals he had made the day before to the ESA Council.

"The Russian political context has changed. The political will to pursue an ambitious space program still exists, as does the Russian industrial complex. We consider such collaboration technically possible and sound. Four months ago, I would not have suggested it," he added.

Hence Mr. Luton's proposal to the ESA Council to conduct an in-depth, three-year study on how the Agency could work with the Russians to reorient the Hermes program. The proposal also calls for the ESA to help build Russia's future Mir-2 space station, and to negotiate a comprehensive plan for three flights involving European astronauts, keeping in mind the interests of both parties in all three cases.

With this plan, the ESA is proposing to save ECU800 million (ECU1 = 6.9 French francs [Fr]) between 1993 and 2000, on an initial budget of 23 billion. The cuts would total 231 for the Hermes program, 128 for earth observation, 140 for microgravity, and 150 for the Columbus program (to the Freedom station). It will also be possible to save another 150 million on technological contracts, and 70 on the Agency's general budget. Scientific and telecommunications programs are coming out unscathed. The proposal, emphasized Mr. Luton, "reconciles Europe's financial limitations and its desire for manned space-transport craft, an ambition that all the delegations again reaffirmed."

With respect to Hermes, Mr. Luton did not deny that the cuts would have consequences, notably for EuroHermespace, the company in charge of all the manufacturing studies in Toulouse. But he affirmed that "the ESA is not abandoning Hermes. On the contrary, it wants to makes Hermes operational more quickly by bringing in the Russians."

The Russians had plans for a similar craft to serve their future Mir-2 station. "That means we can get a development program going with the Russians," say Mr. Luton, "and skip the Hermes-X2000 unmanned demonstrator stage. We will not waste the technical studies that have already been done" (a billion ECUs through 1993). The ESA has awarded 600 million ecus worth of contracts to Russia since early 1992. "If the proposal is accepted," he added, "we plan to spend 100 [million] between 1993 and 1995."

Mr. Luton did not rule out that possibility that if Hermes becomes a EuroRussian program, it could be launched by either the Russian rocket Energiya or Ariane-5, with the first being used for Russian missions and the second for ESA missions.

Besides Hermes, the research cooperation program involves three flights of ESA astronauts between 1994 and late 1997. The second would include a space walk, the third would last six months, and the European would be on-board engineer for the Mir-2 station.

According to the ESA, Mir-2 will be different from today's Mir, which is slated for use until 1996. It will be built over a two- to three-year period around a central mast, like the Freedom station, and will include habitable modules and solar panels resembling large wings. "But we will only provide equipment for it, and not a laboratory module as we are for Freedom," added Mr. Luton. "We will continue our collaboration with the United States on Freedom, for which we are also proposing an automated transfer vehicle based on the Ariane-5 and a rescue vehicle."

Boxed Material: Conclusions of the ESA Council Session of 8 September, 1992

The ESA Council, which met in Paris on 8 September 1992, examined the changes in the Agency's policy and program proposal which the Council debated in June and July of 1992.

Since those last two meetings, new budget constraints have surfaced among the Agency's member states. At the same time, new opportunities have arisen for broadening cooperation with international partners—in particular Russia, but also the United States, expanding the narrow collaboration that already exists with the latter. These opportunities would enable Europe to achieve its goals, including manned flights, in space.

The plan that was presented to the delegations still features a funding package of about ECU22 billion to finance the Agency's activities between 1993 and 2000. That is a reduction of about ECU1 billion over spending proposed earlier by the Agency.

One of the highlights of the new proposal is the introduction of a reorientation phase, which will be devoted to an in-depth study on the possibility of teaming up with Russia to construct a space-transport vehicle and certain service components. In addition, the new proposal contains design studies for the different steps in building a Eurorussian space station, with the first step being a contribution by the Agency to the Mir 2. After the first few years, the two parties will collaborate without exchanging funds.

This phase must be completed within the next three years, after which the parties will make decisions on how to follow up the programs.

The delegations expressed their support for the realistic course adopted by the Agency, particularly with respect to the budget capabilities of its member states. The new

proposal is a solid basis on which to prepare the ministerial Council session at Grenada next 9 and 10 November.

The delegations were also pleased that the budget appropriations for the science, earth observation, and telecommunications programs would remain unchanged. This would enable the Agency to pursue an ambitious program and take the lead, notably in earth observation from space, in solving environmental problems.

With respect to stepped-up cooperation with international partners, in particular Russia, and the joint construction of a future space-transport system and space station, the delegations applauded the importance the general director's proposal accorded to a more international approach toward man-in-space programs. The delegations noted that more thorough analyses still needed to be done in the two months before the ministerial Council session. They invited the general director to prepare a final proposal on the content of the programs being considered as part of the new strategy.

CORPORATE ALLIANCES

Fokker Autonomy After Merger With DASA Noted

92WS0785A Duesseldorf WIRTSCHAFTSWOCHE in German 31 Jul 92 pp 86-87

[Article by Wieland Schmitz: "Threatened Withdrawal: DASA/Fokker: Contract With Pitfalls and Safeguards"; first paragraph is WIRTSCHAFTSWOCHE introduction]

[Text] Like Dornier, the Dutch will enjoy an independent existence within the DASA aerospace group.

"There will be no repeat of the Dornier situation," DASA managers repeatedly assured when discussing the takeover of Fokker NV. However, to acquire the commuter plane manufacturer—one of the flagships of Dutch industry with sales of approximately 3.4 billion German marks [DM]—DASA chairman Juergen Schrempp and his chief financial officer Manfred Bischoff had to make concessions which guarantee the future Dutch subsidiary autonomy lasting as long as that of Dornier and which make the structure of DASA—originally planned as an integrated group—even more confused. The DASA leaders will have to learn to live with a [Dutch] state board member with veto power, which the Dutch Minister of Economic Affairs Kos Andriessen pushed through. Schrempp and Bischoff did manage to limit the state veto to three years, but the seat on the board is guaranteed for eight years.

Fokker also continues to exist as a group with all its departments and is the "prime contractor" for passenger jets with 65 to 130 seats within the DASA alliance. However, according to a colleague of Andriessen, if, despite this, DASA should attempt to "gut" Fokker to the benefit of sites in Germany or in countries with low wages, there is a threat of lawsuits and withdrawal from state contracts in space and arms technology (approximately 15 percent of Fokker's activities) and from government subsidies for aircraft development. Because the Dutch government is and will remain a contractual partner which will monitor compliance with the agreement.

At the end of the negotiations, the Minister of Economic Affairs was correctly able to announce in The Hague: "An outcome of which we can be proud." The Dutch can also be satisfied with the price which the Daimler group has to pay for 51 percent of Fokker's shares: "DM800 million or a bit more" according to insiders at DASA. Fokker itself figures on a total of DM1 billion, almost 10 times its value in 1987 when the Dutch government saved the tradition-rich company with almost 13,000 employees from bankruptcy.

The government under Ruud Lubbers, who in the heated negotiations warned against a threatened "sell-out" of Fokker, is now collecting about DM600,000 million for its 32-percent share. The remainder of the selling price goes into a capital increase. The Dutch will reinvest some of the millions for three years—the duration of the veto right—for participation (22 percent) in the holding company founded by DASA which is to hold the 51-percent Fokker majority.

Schrempp had to accept the high price and the pitfalls and safeguards which the government negotiators built into the agreement in order to obtain the long-sought system leadership for large commuter aircraft. With the entry of Fokker, DASA, already participating as a subcontractor at the rate of 30 percent in the Fokker 100, also acquired a complete world-wide marketing network, which it has previously lacked—with the exception of a few Dornier representatives abroad.

Schrempp had to use all his diplomatic skills in the tug-of-war over the Fokker acquisition which lasted for months, now he can demonstrate his qualities as strategist of the European aerospace industry: The French Aerospatiale and the Italian Alenia, with which Schrempp was still wanting to build his own 100-seater (Regioliner) up until six months ago, are to be brought into the cooperation with Fokker. The plan is that Aerospatiale and Alenia, who together form the ATR consortium, will participate with about 25 percent each in the DASA-Fokker Holding company and jointly finance planned 70- and 130-seat jets. Alenia's parent company, Finmeccania, already holds 6 percent of Fokker.

In addition, Schrempp wants to add the Spanish company Casa, with which DASA is in participation negotiations. However, for the time being, there will be no commuter plane cooperation with British Aerospace, which is currently negotiating with the Japanese and Americans. But even without the British it will be difficult enough to reorganize the aircraft programs and

to reduce overcapacities. The models and projects of Dornier, Casa, Alenia, Aerospatiale, and Fokker still overlap each other in at least five instances.

European Flat-Panel Makers Consider Joint Venture

92WS0831D Paris AFP SCIENCES in French 10 Sep 92 pp 21-22

[Text] Paris—European manufacturers working on flat screens, which may tomorrow replace the big television sets of today, hope to pool their efforts soon in a joint company.

A few Japanese groups such as Sharp or Toshiba monopolize the production of large, flat screens, which already equip portable computers. Their use is limited for now, because they are much more expensive and offer lower large-screen picture quality than do the cathode-tube screens of current television sets.

Since the late eighties, three European manufacturers—the Dutch electronics group Philips, the nationalized French group Thomson, and Planecran, a consortium formed by the French company Sagem and France Telecom's research center (National Telecommunications Study Center, CNET)—have been trying to catch up with the Japanese. Indeed, specialists are expecting a proliferation of flat screens between now and mid-decade, not only in television sets, but in automobile dashboards or "picture phones" such as minitels or videophones.

Planecran officials say that negotiations between the three potential partners are well advanced. They may even result in the creation of a joint company by October. Such a firm would be an event. European high-technology alliances—often mentioned for the manufacture of computers or electronic components—frequently remain stuck in the realm of fine sentiments.

A merger would enable each of the three potential partners to limit costs during a time of budget restrictions. But there are obstacles. The first is that the companies did not make the same technical choices: Although all of them work on so-called "active matrix" liquid-crystal-base flat screens, they do not use the same component to make the crystals alive, which produces different gray levels.

The basic components used in the screens developed by Planecran since 1989 in its pilot shop in Lannion (Cotes-d-Armor) are transistors. In the pilot production line it launched with Sextant Avionique in Grenoble in late 1990, Thomson Consumer Electronics also uses transistors, but with a different fabrication process.

In contrast, Philips—which is the most advanced of the three and has invested over a billion French francs [Fr] against Planecran's Fr150 million and Thomson/Sextant's Fr100 million—uses diodes as its basic component. But the methods used by Planecran and Philips employ the same fabrication tools, which would enable them to manufacture the two types of screens in the same shops until it became clear which method was the most effective and for what applications.

Moreover, each of the potential partners has different goals. Philips is primarily seeking to develop new television screens; Sagem is interested in assisted-driving screens for automobiles; and the CNET is focusing on picture telephones. Finally, because of its association with Sextant, Thomson's primary aim is to develop screens for airline and military planes, without losing sight of television applications.

Alenia, Hispano-Suiza Form Euronacelle

92WS0832C Paris AFP SCIENCES in French 10 Sep 92 p 18

[Text] Farnborough—The Italian group Alenia and the French group Hispano-Suiza (a National Aircraft Engine Research and Manufacturing Company group) announced an agreement 7 September in Farnborough to create a joint company dubbed Euronacelle. The company will specialize in jet nacelles and thrust reversers.

The two founding companies will hold equal shares in Euronacelle, which will be based in France, said the president and general director of Hispano-Suiza, Raymond Poggi, and the president of Alenia Aeronautica, Roberto Mannu. The new company will be responsible in particular for the sale of nacelles and reversers, and for the coordination of research and technology programs and industrial investment into the same. For now, the manufacturing operations of the two partners will remain separate.

Euronacelle hopes to capture "over 25 percent" of a market that is estimated at some 10 billion French francs [Fr], according to the two groups' presidents. Alenia and Hispano-Suiza stressed that pooling their capabilities and resources would allow them to "save," but gave no other financial details.

CEA, France Telecom To Take SGS Thomson Share

92WS0833A Paris AFP SCIENCES in French 10 Sep 92 p 23

[Unattributed article: "CEA Industrie and France-Telecom Take Over the French Participation in SGS Thomson"]

[Text] Paris—CEA-Industrie, in partnership with France Telecom, will "take over" Thomson-CSF's interest in the French-Italian component manufacturer SGS-Thomson, the Ministry of Industry and Foreign Trade indicated in a communique on 10 September.

"Recapitalization of the company will be proposed to its European partners as soon as possible," the communique added. The Italian share of SGS-Thomson, which suffers from considerable undercapitalization while

operating in a capital-intensive sector, is held by the state-owned IRI [Industrial Reconstruction Institute] holding. The Thomson group, "like the other shareholders, will continue to participate in developing the activities of the company."

The former president of the Orkem chemical group, Mr. Serge Hirel, whom the government had appointed to consider CEA-Industrie's contribution to the development of the electronic industry, will be proposed for the position of CEA-Industrie's president, the ministry indicated.

"After consultation with the presidents of Thomson SA and France Telecom, Mr. Hirel will define as soon as possible CEA-Industrie's and France Telecom's levels and modes of intervention, as well as their resulting responsibilities, in order to contribute to the development of SGS-Thomson in partnership with Thomson-CSF," the communique stated.

On the other hand, the ministry mentioned only briefly the future of Thomson Consumer Electronics (TCE) branch, which was included in the former prime minister, Mrs. Edith Cresson's project of creation of Thomson-CEA Industrie. TCE's situation "will be considered with a view to making a first assessment of the recovery plan launched by its new president, Alain Prestat," the communique indicated.

UK Firm To Distribute Thomson CSF Computers

92WS0833C Paris PRODUCTIQUE/AFFAIRES in French 10 Sep 92 p 5

[Unattributed article: "Thomson CSF Signed Military-Computer Distribution Agreement"]

[Text] The French group Thomson-CSF has signed a marketing and distribution agreement with the British Computing Devices Company; the agreement covers military MLX-UR computers developed by Thomson-CSF. Computing Devices Company, a British Army supplier, will distribute MLX-UR enhanced workstations for military and industrial applications. These security workstations are used in particular to operate the command systems of the various arms. The British group thus expands its line of workstations for the multiple applications of the information and command systems of the British Army's three arms.

CEA, France Telecom Buy SGS-Thomson Shares

93WS0020D Paris AFP SCIENCES in French 17 Sep 92 p 14

[Unattributed article: "CEA-Industrie Allied to France Telecom to Take Over Thomson's 'Chip' Sector"]

[Text] Paris—Nine months after announcing the creation of a large French technological group covering the nuclear, television and electronic "chips" sector, the government presented on 9 September a more modest plan restricted to "chips" alone. The minister of industry, Mr. Dominique Strauss-Kahn, announced that the Atomic Energy Commission's (CEA) industrial subsidiary, CEA-Industrie, and France Telecom were acquiring an interest in the electronic-component manufacturer SGS-Thomson, which is in serious trouble.

Although the plan ignores the difficulties experienced by the TV manufacturer, Thomson Consumer Electronics, nevertheless, according to the government, it will ensure "the development of the French electronic industry" by giving CEA-Industrie the status of a large industrial group both in the nuclear and in the electronic sectors. The plan will also take advantage of the "synergisms" that exist between the CEA's and France Telecom's research on electronic components, carried out in their respective laboratories, the LETI [Laboratory for Electronics and Data Processing Technologies] and the CNET [National Center for Telecommunications Studies] in Grenoble, the minister of industry emphasized.

Already involved in large companies in the nuclear sector, such as Cogema [General Nuclear Materials Company] and Framatome [Franco-American Nuclear Construction Company], and in medical and data-processing technologies, CEA-Industrie should take on new dimensions: its personnel is expected to increase from the 37,000 currently on record to 45,000 people, and its activities should amount to 50 billion francs [Fr], compared with Fr39 billion in 1991, according to its new president, Mr. Jean-Claude Hirel's associates. The first project, presented in December 1991 by then prime minister Mrs. Edith Cresson, was for the creation of a group "worth" Fr90 billion.

Under the conditions of the operation, CEA-Industrie should become the leading French shareholder of SGS-Thomson, together with France Telecom and the nationalized Thomson-CSF group (the Thomson group). Until now, the latter was holding all of the 45-percent French interest in the French-Italian group. The state-owned Italian industrial group IRI [Industrial Reconstruction Institute] owns 45 percent of the shares, and the British group Thorn-EMI the remaining 10 percent. France Telecom and CEA-Industrie's acquisition of a share in SGS-Thomson capital should make it possible to inject fresh capital into the company soon, as its activities are deemed "strategic" to counter the Japanese dominance in this sector.

For months, the French government has acknowledged that the company, which is collapsing under a debt of close to Fr1 billion and had losses of some Fr500 million in 1991, must be recapitalized. Reorganizing the French participation will now enable the government to suggest to its Italian partners to "recapitalize as soon as possible," the minister of industry indicated.

CORPORATE STRATEGIES

Siemens Head Discusses Diversification

92WS0786A Duesseldorf VDI NACHRICHTEN in German 31 Jul 92 p 7

[Text]

"Fingers Burned in Unfamiliar Branches"

Diversification: Siemens Head Kaske Distances Himself From Competitors

Munich Firm Wants to Grow Exclusively in Traditional Business

Many large firms have developed totally different lines of business in recent years. Siemens, however, remains true to electrical engineering and electronics. Why? Departing Siemens head Karlheinz Kaske responded to this question recently in Dresden. Here is an excerpt from his speech.

With a volume of almost 3000 billion German marks [DM], the global market for electrical engineering and electronics is enormous. It is growing at a real rate of about 6 percent to 7 percent annually, which is twice as fast as the general gross national product. Thus, concentrating on this large and dynamic market does not represent a de facto restriction on business.

Based on purely theoretical considerations, it is easy to postulate going into new branches of industry for the purpose of spreading risks. This is seldom carried out successfully because there is insufficient familiarity with the technological challenges and specific market conditions. In any case, some of our competitors have burned their fingers severely in this attempt.

Unlike them, we do not find risk distribution by going beyond our traditional areas of activity, but rather within these boundaries. These days in particular this seems especially evident:

- While a wide range of industrial activities suffer from the weak international economic situation, business thrives with infrastructure projects.
- While we are still in the red with data systems technology and semiconductors for reasons which have been explained to you, among which are industry crises, we are making profits in other areas.
- While we are economically cautious in some areas, we are profiting in others from strong upswings.

And so I have mentioned a very important argument which explains the diversification of our company. It is, in fact, true that Siemens is one of the most universal firms in electrical engineering and electronics, with the clear emphasis on capital goods. This business orientation follows from the tradition of our company, which is based on the production, distribution, and application of both "high voltage" and "low voltage" power. This basic orientation continues to be the defining element of the Siemens company. In these areas, we have actively participated in the development of the industry, which was characterized in recent years by the advance of microelectronics, and will continue to try to be in the vanguard.

Siemens's Strategy to Cut Losses in Semiconductor Area

92WS0797 TOP-BUSINESS in German Sep 92 pp 52-58

[Article by Klaus Westermeier]

[Text] For a long time Siemens has accepted the very red numbers for the chips as God-given. The head of semiconductors, Juergen Knorr is now determined to force a turn-around with rehabilitation measures without compromises.

The exact losses are one of the best kept secrets in the Siemens AG. However, estimates for the current fiscal year (ending September 30, 1992) in the amount of 550 million German marks [DM] of deficit are not contradicted by Siemens managers. The analysts of S.G. Warburg Securities even predict a deficit of DM600 to 700 million in their latest Siemens report. This dramatic loss is currently reported to the central offices at Wittelsbacher Platz in Munich by the semiconductor department (HL) of the electronics giant (1991/92: sales of DM80 billion, more than 400,000 employees).

No German company and also, no division of a company in this country, perhaps with the exception of Lufthansa, will report a greater loss for the current year. And this with a mini-sale of only DM2 billion.

There is a tradition for such bad news from semiconductors: For a decade, since the Siemens president Dr. Karlheinz Kaske (64) and his head of research at the time, Prof. Karl Heinz Beckurts—who was murdered by terrorists in 1986—plunged into the "Mega-Project" concerning dynamic memory chips (DRAMs) in competition with Japan, there has been to date a bottom line of a negative cash flow of about DM5 billion. Siemens was only able to get back DM300 million from public development funds.

However, the success has been considerable: The delay of three years in chip technology—the predecessor of Kaske, Bernhard Plettner (77) had slept through the signs of the time—has been largely made up and the memory chip factory in Regensburg attains one of the highest outputs in the world, a mark of control in the expensive manufacturing process.

While concentrating on what was feasible, however, the costs went out of control. Because the strategists at Siemens considered the domination of the memory chip technology as indispensable for securing the future of the company, this "necessary evil" was considered as a sacred cow (S.G. Warburg). It was argued that those who are in the forefront in the field of memory chips will also

be able to produce the so-called ASICs, the logic and application chips which are used in many parts of computer, telecommunication, entertainment and automobile electronics, as well as automation technology.

However, remoteness from the market, enamored of detail and burdened by a huge swollen head, the department, headed by Juergen Knorr (59) slid more and more into the red ink zone. In the beginning it was still possible to write off the spending of DM3 billion for research and development of the 1 and 4 megabit chips, as well as for the construction of the factory in Regensburg, as painful growing steps, but the HL-balance sheet still did not improve after the production of the miniature components got into gear.

And the worst: It is not only the memory chips which currently represent about a quarter of the HL division with sales of about DM500 million, but also the application specific integrated circuits, on which great hopes are based, that contribute now almost half of the horrendous losses. At least these deficits of several hundred million mark are self-induced. While the price war rages for the DRAMs and competitors, such as the dominating big three NEC, Toshiba and Hitachi are subsidizing, "the ASICs should clearly show a profit," according to the UBM expert Klaus von den Hoff.

However, with 8,000 different logic and application chips, Siemens offers too many products in, in some cases, too small lots and let itself be pushed into high priced corners, which cost it its price leadership. In addition, the much touted interface between DRAMs and application chips is not working as desired. The in-house producers of ASICs do not utilize the expensively researched newest memory technology, particularly because "the greatest part of the Siemens business is based in conservative industries with long product durability cycles" (S.G. Warburg). Unlike in entertainment electronics, the newest generation of memory chips is not really needed there. They will much rather wait until the price drop for the new chips is setting in. For this reason, logic and application chips are so far almost not produced in Regensburg. At any rate, only about 15 percent of the Siemens chips wind up in Siemens devices. The rest is sold on the market at a loss.

Last summer, when, after a breather, the deficit had again climbed to about half a billion mark, the central administration of Siemens had enough. Kaske himself introduced a program for deficit reduction in semiconductors—however, with the admonition that the future of the department should not be endangered by too radical steps. The head of the concern, who is leaving on September 30, 1992, appears to have had the intention to set the switches for "his baby" now, before a subsequent generation of Siemens manager, possibly more attuned to cost cutting, would rehabilitate the semiconductor division to death.

At any rate, the basic thesis—long term competitiveness in the electronics field is based on chip know-how in-house—is now being intensely questioned. The Warburg analysts even call the Siemens fear of being dependent on Japanese semiconductors as paranoia. After all, Siemens is the last of the Europeans who still participates in the risky race for the next DRAM generation. Philips, who was once a partner in the Mega-Project has long ago bowed out.

Other electronics giants in chip intensive market sections have never participated in the race for the small drivers of technology.

In order to silence the admonishers, such as financial head Dr. Karl-Hermann Baumann (56) or head planner Hermann Franz (63), in their own ranks by improved numbers, the HL-head Juergen Knorr has scoured every corner of his shop for almost a year. Knorr, a protege of Kaske, who assumed leadership of the newly formed semiconductor division in 1988, brought four McKinsey teams (location structures, overheads, productivity increase, development efficiency) into the house and has since introduced the new strategic alignment. About 50 percent of the distance, according to estimates by an insider, have been negotiated in the decision making, and have in part also been implemented.

Every three months Knorr reports on his progress to the central administration and receives the blessing for his measures by the almighty Siemens body.

The former production manager registered the greatest progress in location optimization. Two thousand jobs for the bipolar circuits will be eliminated at Balanstrasse in Munich by 1994 and the production shifted to Villach (Austria). In Perlach, the famous Hall 95, where the Mega-Project had been realized, will be dismantled with its 300 people. Any other final assembly work still remaining in Europe will in the future be shifted to the more cost efficient Siemens factories in Singapore and Malaysia.

Apart from these in-house tasks, the economics minister Juergen Mllemann unwittingly speeded up the HL location concept. During this year's Cebit Mllemann demanded the construction of a new plant for the 64-M-chip, currently being developed by Siemens and IBM and ready for production in 1995. After loosing a subsidy feeler for setting up this production facility, Siemens said no. The 64-M will be built in one of the existing superclean-rooms in Regensburg, Villach or the plant for 16-M-chips, which is currently being built with IBM in Essonnes near Paris.

Apart from this basic decision, Knorr has also made progress with the bloated overhead. Of the almost 2000 administrative jobs, some 40 percent are to be eliminated. Four hundred of the 800 positions designated for elimination have already been identified, half of which have already been quietly executed. At the same time, two levels of hierarchy were deleted, one of which between the HL division board and the individual department heads.

Overall, Knorr, an electrical engineer who started at Siemens as intern and assistant metalworker, plans to reduce his staff from the current number of about 14,200 to 12,000 within the next one to two years.

Pioneering alliance Knorr, a friend of the McKinsey head Prof. Herbert Henzler, has also taken a mighty step forward in the huge R&D expenses. Already in 1990 Siemens made an agreement with IBM to share the R&D costs for the 64-M in a joint venture. A year later Kaske and IBM president Jack Kuehler agreed to build a joint plant for the 16-M in Essonnes. Now, an almost historic agreement has been made: Siemens will develop the next generation of memory chips, the 256-M chip, jointly with IBM and Toshiba. Toshiba is No. 2 in the world in semiconductors (see table page 58). In this manner the estimated billion dollars of R&D costs will be split three ways. If the declaration of intention for this pioneering cooperation, as announced a few weeks ago in New York, will also be followed by deeds, the statement by Tsuyoshi Kawanashi, Senior Vice President of Toshiba, "This is the most important agreement in the semiconductor industry" could become true. As Kaske, Kawanashi and Kuehler of IBM stated in unison: "for the first time the pacemakers of the triad markets are sailing in one boat."

The driving force in the background of the trilateral deal was Knorr, who has for a long time considered the confrontation with Japan as outdated. An earlier try, three years ago, by the man from Berlin had been blocked because at that time it was still considered unseemly at Siemens to have common cause with the declared enemy.

Closing ranks with Toshiba at the current time is possibly also a reaction to the latest subsidy debate where Siemens got a bloody nose in Brussels, in Bonn and even from the business association and its president, Heinrich Weiss.

It was less vision and more hard labor which Knorr had to provide in order to get a hold on his worsening sales problems. For this purpose he hired Hans-Dieter Mackowiak, a smart Mitsubishi manager for Europe. For almost a year Mackowiak has now been trying to liven up central sales by active marketing. Large clients, such as Grundig, Bosch, IBM or DEC will be increasingly cared for by so-called key-account managers. For the remaining clients Mackowiak streamlined the German distribution network from seven to four branches. For this purpose, Mackowiak had to fight regional and state princes abroad who hate it, if someone looks at their deck of cards. In addition, the whole production selection is stripped of too small lots.

Knorr also activated an even bigger wheel in cost control with another measure: because the subsidies are still highest for the sale of each and every memory chip, he reduces this share of the whole semiconductor business: from the former 40 percent to the current 25 percent. According to the spokesman for HL, Klaus Knapp, the target level is a share of less than 20 percent. ASICs are supposed to fill this gap. The future head of Siemens, Dr. Heinrich von Pierer (51) has already made it unmistakably known that he sees the HL future primarily in the logic and application chips.

Knorr also provided the first indications in the personnel ranks. Apart from Mackowiak, the Siemens board and top HL managers hired Volkart Matthus as his aide as a future business leader. Matthus, who has already lived through the reorganization of a multi-year loser at Siemens Energy and Automation in Atlanta, U.S., is now adapting Knorr's strategies to the daily operations and takes care that the speaker for the division manager retains grass root contact.

Depowerment of the Obstructionists

The selection of Dr. Hans Baur (63), member of the Siemens Board of Directors, as successor to Kaske for the supervision of the semiconductor business in the central management is also considered a felicitous choice. The future HL godfather is a good coach and he will be granted the necessary authority to get the remaining painful 50 percent of the reconstruction through the central management.

A particularly delicate task is already planned for this fall: about a dozen veteran HL managers, who were mainly hired under the division managers, have to give up their positions. Capable young employees, who feel that the dismantling of the paralyzing structure is not proceeding fast enough, are already walking away. According to gloomy observers, if the depowerment of the obstructionists does not proceed apace, the success of the whole operation could be endangered.

Thomson-CEA To Focus on Nuclear Issue, Basic Research to Suffer

92WS0802D Paris LE MONDE in French 20 Aug 92 p 14

[Article entitled: "A Draft Decree Redefines the Missions of the CEA"]

[Text] The Atomic Energy Commission (CEA) is in a state of turmoil again. A draft decree from the Ministry of Research redefines its mission by arguing for a shift back to nuclear affairs and away from diversification, and by curtailing its authority over basic research.

Ministry officials assure those who ask that there is no relation between the move and the Thomson-CEA Industrie affair. But like the plan to combine Thomson's civilian electronics with the CEA's nuclear division, the decree cooked up early this summer by Hubert Curien's staffers was the subject of various lively debates within the government. More discreet ones this time.

The first hash of the decree, which was sketched out in early July, called for the transformation of the Atomic Energy Commission, a sui generis department, into an

industrial and commercial public establishment (EPIC). The promoters of this status saw it as a way to instill a new dynamism into a CEA that is perceived as a fortress and an institution. Moreover, its status as an EPIC would give the Atomic Energy Commission a new management structure. The general administrator, who runs the organization, would be replaced by a more common "executive body," including a president and a general director.

This change would ipso facto make the current general administrator of the CEA—Philippe Rouvillois, who was reappointed at the beginning of the summer with the lukewarm approval of the Research Ministry—president of the board of directors. Real management of the CEA would be transferred to a general director more to the liking of Mr. Curien's staff (the name of Claude Mandil came up several times, but is no longer cited) and who is a member of the mines corps. Apparently this initial trial balloon caused some irritation within the departments of the Ministry of Industry, which favor the reappointment of Mr. Rouvillois.

A second one was floated from interministry meetings that were held in July. It modified Article 2 of the CEA's statutes, which defines its research missions. The Atomic Energy Commission has been shorn of much of its authority over basic research, and its applied-research allocations have been channeled solely into nuclear studies. This version, which is causing some ferment among CEA personnel, is a compromise. But it will not necessarily be the final rehash.

SNECMA's Organization, Role of Subsidiaries Viewed

92WS0806A Paris LA POSTE REFERENCES in French Jul/Aug 92 pp 22-25

[Article entitled: "Strength in Partners"; first paragraph is LA POSTE REFERENCES introduction]

[Text] In SNECMA Partenaires—a leader in the production of aeronautic and space engines, which makes nearly 60 percent of its sales from exports—there is solidarity between the parent company and its subsidiaries. The group's new identity now enables it to take advantage of the ways each partner company's specialties complement one another. The better to cope with a serious economic slump.

Every 12 seconds a plane propelled by SNECMA [National Aircraft Engine Research and Manufacturing Company] engines takes off somewhere in the world. It is an impressive credential for the group, which employs nearly 27,000 people and has a turnover of almost 24 billion French francs [Fr].

Last 11 July, the aeronautics leader was rebaptised SNECMA Partenaires. The name highlights the way the specialties of the seven companies, which together handle the entire range of engine- and engine accessory-making, complement one other. The companies include SNECMA (the parent company, which designs the engines), the European Propellant Company (Ariane's rocket engines), Messier-Bugatti (landing gear and brakes), Hispano-Suiza (power transmitter and nacelles), Sochata (engine repair), FN Moteurs (parts manufacture and assembly), and Famer (precision mechanics). Within the group, SNECMA's daughters are giving official notice of their synergies, in order to expand more strongly abroad and meet the demands of already loyal customers. "It is no longer possible to carry out an aeronautics and space program without partners, [who are needed] both for splitting research costs among the participants and creating markets to which one has privileged access. Partnerships in our industry are now unavoidable," explains Alain Bosser, the director of subsidiary and stock-investment management.

A Structure Built Around Specialties

SNECMA Partenaires as a whole is made up of 100 companies, including the seven "major" ones, 30 subsidiaries and direct ownership interests, and 60 distant cousins. Although the hard core of the group's main companies are responsible for 90 percent of its activities, it is also involved in organizations that are less closely tied to its principal business. Examples include the Midi-Pyrenees Regional Institute for Industrial Development, which helps local small businesses grow, and in which SNECMA Partenaires has a capital stake of 0.30 percent.

The group's structure was designed around specialized occupations. The parent company SNECMA, which accounts for about 60 percent of the group's sales, is responsible for the heart of the business, the design of aircraft engines. Its work is enhanced and completed by the specific tasks of the subsidiaries. Sochata repairs, Famer machines, SEP ventures into space, and Messier lands. Parent and daughter companies also have a customer-supplier relationship, since SNECMA purchases a significant share of what Hispano-Suiza and FN Moteurs make.

The group's subsidiaries retain their latitude in defining and implementing their growth policies. The parent company does not exert continuous control over their actions, and the subsidiaries function with their own boards of directors and treasuries, thus operating like major companies.

A Group Dynamic To Meet a Tough Downturn

However, SNECMA still owns a share of the capital of its subsidiaries (ranging from 100 percent for Famer to 51.7 percent for SEP) and remains the majority shareholder of its six daughter companies.

SNECMA has been involved in the great events of the history of aviation and space for nearly 50 years now. The group was created in 1945 by General De Gaulle, who wanted to restore France to its rank as a major aeronautic enginemaker in the postwar world. At the time, SNECMA combined the main "airplane engine"

divisions of France's big machine companies to form the Gnome-et-Rhone company. Today it is one of the top four makers of civil and military aircraft engines in the world. The CFM 56 engine that it comanufactures with General Electric is still the group's bestseller: It is used by 150 airlines and over 1,700 planes, and the 5,000 engines that are in service tirelessly log in 21,000 hours of flight each day! What is more, there are currently orders for over 6,000 CFM 56s on SNECMA Partenaire's books.

The group's remarkable penetration of the civil aviation market has stood its sales structure on its head over the last 10 years: SNECMA has shifted from doing 80 percent of its business with military customers between 1975 and 1980, to 70 percent civil sales between 1986 and 1991. This is true despite the mixed year SNECMA Partenaires had in 1991.

Enginemakers are, in fact, in the midst of a serious slump, characterized both by a drop in traffic and continuing price wars among the airlines. According to the OACI [International Civil Aviation Organization], world air traffic dropped by over 4 percent in 1991 for the first time since 1946. The airlines' earnings are down sharply, and there is a tendancy among big finance companies to back away from aeronautics. Airplane orders are starting to drop, resulting in a nearly 30-percent shortfall in predicted spare parts orders—an important source of manufacturer profits. Moreover, military aeronautics budgets are down. Program authorizations were pared down by 7 percent in France, and not a single new export order for a military engine was written in the last 12 months.

In this very tight market, three of the group's companies are struggling. Messier-Bugatti, pummeled by the drop in demand, is running a deficit. Sochata has also posted substantial losses, the result of significant cutbacks in repair work and the disappearance of certain military markets. As for FN Moteurs, it is obligated to implement a large "social plan" [retraining or other benefits for laid-off workers].

SNECMA Partenaires's decision to base its strategy on the solidarity that exists among the group's firms may lead it to redistribute some of its cards. Time will tell whether the new group dynamic will enable the partners to give each other a boost.

SEP, the Subsidiary With Wings

The European Propellant Company (SEP) is SNECMA Partenaires's top subsidiary in terms of size and staff, with personnel of nearly 4,000 at its Suresnes headquarters and five national sites. It is one of the rare companies in the world to master the two propulsion technologies, powder and liquid. Known to the general public for making the engines of the Ariane rocket, SEP designs, develops, produces, tests, and markets engines whose thrust ranges from 500 grams to 600 metric tons. It is also responsible for the ballistic missiles of France's dissuasive force and techniques for manufacturing composite materials. SEP handles all the space-related activities of the SNECMA Partenaires group. The high-flying subsidiary has over 50 percent of the world market for commercial satellites. As the chief contractor for the three-stage propulsion units of the [Ariane] launcher, SEP was the biggest European manufacturer in the program from the outset. It coordinates the development, production, assembly, and testing for all of the launcher's liquid propulsion engines (there are 10 SEP engines in the most powerful version). In 1991 Ariane 4 made eight successful launches, five of them during a five-month period in the second half of the year. That is an astronautic record. The Ariane 5 will succeed the Ariane 4 in 1995, to enable payloads heavier by one half to be placed into orbit. As chief contractor for propulsion of the main cryotechnical stage, SEP's responsibility in the program is crucial. It is also responsible for powder propulsion through Europropulsion, a consortium which it holds in equal shares with BDP. The first long-term tests of the new Vulcain engine, which will provide 110 metric tons of thrust, were successfully completed in June 1991. The first nozzle of the Ariane 5 booster was delivered in October 1991, only 12 months after the inauguration of the "nozzle and booster" factory in Bordeaux. The factory was specially built and equipped for the purpose, through broadened European collaboration. Given the cuts in military programs and the uncertainties surrounding the development of some new civil space programs (notably Hermes and Columbus), SEP has begun thinking about how it can diversify its aeronautic activities using skills it has gained in the space and military fields. It is looking, in particular, at the energy, transport, and environmental industries. SEP is also counting on alliances to expand its presence in the world market and enlarge its product line. It has consequently teamed up with SNECMA company to form the consortium Hyperespace for hypersonic propulsion research, is collaborating with FN Moteurs, and is coordinating its composites work with Hispano-Suiza. The above strategy should enable SEP to rise as far as posssible above the turbulence that is agitating its military sector, which has been hard hit by the aftermath of the Gulf War.

The Players of the SNECMA Partenaires Group

SNECMA Partenaires, 26,700 People, 57% of Sales from Exports

Company Name	Products	Shareholders	Sales in French Francs	Number of Personnel
FN Moteurs Co.	Airplane engines, repair and alteration, rocket engine components	SNECMA 51%, SRIW (Walloon region) 30%, Pratt & Whitney 19%	1,135 million	1,400
Messier-Bugatti & Subsidiaries	Landing gear, brakes, hydraulic systems	SNECMA 79.45%, Lucas Aerospace 20.54%	2,425 million	2,700
Famer	Precision machining, tooling	SNECMA 100%	79 million	200
Sochata	Repair and alteration of airplane engines	SNECMA 100%	1,065	1,400
European Propellant Co. & Subsidiaries	Missile and space vehicle propulsion units, thermostructural components	(Listed on France's second—intermediary—stock exchange) SNECMA 51.7%, Aerospatiale 13.7%, SNPE 8.6%, L'Air Liquide 7%	4,536 million	4,000
Famat	Manufacture of engine parts	SNECMA 50%, General Electric 50%		500
Hispano-Suiza & Subsidiaries	Thrust and nacelle inverters, power transmission systems	SNECMA 100%	2,174 million	2,800

Aerospatiale CEO Assesses Group's Prospects

92WS0807D Brussels EUROPEAN AVIANEWS in English Jul-Aug 92 p 16

[Article: "Aerospatiale Group's Prospects"]

[Text] Henri Martre, CEO of Aerospatiale, recently talked about this French group's prospects for development. According to him, Aerospatiale should see a strong growth in turnover in the medium term, rising from Fr49 billion (ECU7.1 billion) in 1991 to 72 billion (ECU10.44 billion) at the end of 1994. This high growth (9 percent in today's French francs, or around 5.5 percent growth in annual volume) is a direct consequence of the increasing importance of new programmes. Moreover, after two exceptional years in 1989 and 1990 followed by a drastic reduction in 1991, the order book currently accounts for three years of work (around Fr145 billion, or ECU21 billion). In the coming years, orders should stabilise at an average annual rate of some Fr55 billion (ECU7.97 billion). This will cover two years' work, or Fr135 billion (ECU19.6 billion) at the start of 1995. These forecasts are based on the following targets in terms of market shares: 30 percent for civil aircraft; 40 percent for helicopters (not including eastern countries); 50 percent for civil launchers; and 30 percent for communications satellites.

Sweden: Ericsson Returns to Profitability in Second Quarter

92WS0807L Chichester INTERNATIONAL TELECOMMUNICATIONS INTELLIGENCE in English 31 Aug 92 p 15

[Text] Ericsson managed to return to profitability in the second quarter of this year after turning out a SKr363 million loss in the first quarter. However, the company's previous projections regarding continued low income for the full year remain unchanged.

Second quarter pre-tax profits were SKr422 million on net sales of SKr10,849 million. This compares with last year's second quarter pre-tax profits of SKr766 million on sales of SKr11,814 million.

For the six months ended June 30, 1992 net sales declined 10 percent on the same period last year to SKr20.311 million. Consolidated pre-tax income for the period amounted to SKr59 million, including SKr42 million in capital gains, compared with SKr1,775 million, including SKr79 million in capital gains, last year. The loss per share, after actual taxes and full conversion, was SKr1.34, versus income of SKr5.26 in the first half of 1991.

Order bookings for the first six months of this year increased 24 percent to SKr26,770 million, from last year's first half figure of SKr21,550 million.

Breakdown of Sales of Product Sector (SKr million)

	2nd Quarter	% chg	1st half	% chg
	1992	91/92	1992	91/92
Public telecoms	4,585	-16.5	8,748	+18.7
Radio communications	3,373	+1.4	6,100	-1.6

Breakdown of Sales of Product Sector (SKr million) (Continued)

	2nd Quarter	% chg	1st half	% chg
Business communications	1,160	-6.3	2,192	-4.5
Cable & network	1,833	-0.4	3,402	-1.2
Components	514	-13.5	910	-20.0
Defense systems	461	-5.5	965	+11.6
Other operations	296	+2.4	593	+13.4
Less: Intersegment sales	-1,373	-5.4	-2,599	-5.5
Total	10,849	-8.2	20,311	-9.6

Breakdown of Sales by Geographic Area (SKr million)

	2nd Quarter	% chg	1st half	% chg
	1992	91/92	1992	91/92
Europe (excluding Sweden)	4,821	-5.1	8,906	-11.4
Sweden	1,458	-6.1	2,879	-4.3
U.S. and Canada	1,378	-10.2	2,604	-13.4
Latin America	1,247	-18.1	2,474	-5.2
Africa	107	-34.3	301	+5.2
Asia	920	-0.4	1,552	-5.2
Middle East	382	-34.1	685	-23.2
Oceania	536	+17.5	910	-6.3
Total	10,849	-8.2	20,311	-9.6

The company said it was able to reduce total costs in the first six months of this year, despite a slight increase in technological developments costs, as a result of ongoing cost-savings programmes which has involved a reduction in its workforce by about 6,000 people. Half of the reduction is attributable to the divestment of the telephone operating company in Argentina (see ITI issue 336). At the end of June 1992 the total number of employees was 66,082.

Ericsson's investments in property, plant and equipment amounted to SKr1,162 million which was almost 28 percent down on the previous year's first half investment of SKr1,610 million. Of this, expenditure in Sweden totalled SKr545 million in the 1992 half year and SKr759 million a year earlier.

CEA Industrie-France Telecom Venture To Take Over Thomson's Electronics Sector

92WS0810A Paris LE MONDE in French 11 Sep 92 p 16

[Article by Pierre-Angel Gay and Caroline Monnot: "The Government Weds Thomson's Components with the CEA and France Telecom"; first three paragraphs are LE MONDE introduction]

[Text] The final act in the long reorganization of France's electronics industry is here. Turning its back on Edith Cresson's dream of a Thomson/CEA-Industrie group, the government announced Thursday, 10 June, that it was shifting components to a new entity that will replace SGS-Thomson. The new organization will be shepherded by CEA-I, the Atomic Energy Commission's industrial subsidiary, and France Telecom.

A fresh influx of capital is proving vital to lighten the financial burden of the Thomson group, which is keeping its consumer electronics business. On the other hand, the future of Thomson Consumer Electronics is far from settled.

Minister of Industry and Foreign Trade Dominique Strauss-Kahn presented his plan to reorganize the French components industry on Thursday, 10 September. The Atomic Energy Commission's industrial subsidiary CEA-I and France Telecom will manage the sector, taking over for the Thomson group. Thomson, on the other hand, will retain its consumer electronics business, whose problems are far from resolved. The government has thus opted for a partial solution and dropped the idea of creating the "Thomson/CEA-Industrie" of which Edith Cresson dreamed.

It is "chips" instead of television sets. Unable to do it all, the government has decided to settle the SGS-Thomson issue without further delay, and postpone possible support for Thomson Consumer Electronics (TCE). The two struggling subsidiaries of the group managed by Alain Gomez will thus have separate fates. Their integration into a French-style Toshiba or Siemens—a move that

was advocated by former prime minister Edith Cresson and her special adviser Abel Farnoux—had, in fact, been off the agenda for some time.

Barely a month after announcing the creation of Thomson CEA Industrie, Mrs. Cresson had already publicly shifted her concern back to components, the "lifeblood of electronics" (see LE MONDE, 22 January). It was a preoccupation that the minister of industry and foreign trade had shared for some time, having pleaded since the day he was nominated for a European electronics agency.

Jean-Claude Hirel, President of CEA-I

The reticence of the main players in the nuclear industry to refloat France's TV manufacturing sector did the rest. The CEO of Cogema, Jean Syrota, was at loggerheads for months with Thomson group CEO Alain Gomez just on the subject of how to assess TCE's value. The gap between their two estimates was no less than 10 billion French francs [Fr]! Under the circumstances, even the withdrawal option put together by Treasury director Jean-Claude Trichet became impracticable. It was not possible for CEA-I to acquire a capital stake in TCE and SGS-Thomson simultaneously.

So, a few days before a major election of uncertain outcome, the government decided to get back to basics and realign the sector around SGS-Thomson. The decision marks a return of public authorities to the general thrust of proposals made by Jean-Claude Hirel, a former member of Jean-Pierre Chevenement's staff and president of Orkem. Mr. Hirel was asked by Edith Cresson to ponder the question of how to finance the electronics industry during the summer of 1991. According to the communique the Ministry of Industry was preparing to distribute Thursday morning, Hirel will be named president of CEA-Industrie within the next few days. CEA-I will be promoted to the rank of new leader of the French electronics industry, "in association," stipulates the government's text, with France Telecom. The CEA's industrial subsidiary and the telecommunications carrier are thus replacing the Thomson group, which, for lack of resources and will, had de facto turned down the job.

The financial details of this transfer of responsibilities are complex and still unknown. Alain Gomez's group is the primary shareholder, together with the Italian government's industrial holding company IRI, of SGS-Thomson, and will sell off the better part of its shares to a new entity formed by CEA-Industrie and France Telecom. The Atomic Energy Commission's subsidiary will have majority control of the new holding company, which makes it the chief industrial player.

The mission of CEA-Industrie and France Telecom is clear. Their main job is to provide the heavily endebted SGS-Thomson, whose estimated obligations total Fr5 billion on turnover of Fr8 billion, with the financial wherewithal to grow. The semiconductor maker needs fresh cash—an estimated Fr2.5 billion in 1992 and 1993—to reduce its interest expenses and take part in the technological race. To keep up the fight, Europe's second-largest electronics manufacturer must be recapitalized. Moreover, the needed capital injection has been the topic of thorny negotiations with the Italian shareholders for nine months. According to the Ministry of Industry, the negotiations are on the verge of success.

TCE's Recovery Plan

The cutting-edge nuclear and telecommunications industries must contribute even more concretely than they have so far to the research effort. Indeed, the communique states that "the [group's] restructuring" will "step up technological collaboration between SGS-Thomson on the one hand, and the Laboratory for Electronics and Data Processing Technology (LETI) and the National Center for Technical Studies (CNET) on the other. The laboratories belong to the CEA and France Telecom respectively." SGS-Thomson and France Telecom are already collaborating on an ultra-fine etching technology for silicon boards in the Grenoble 1992 program.

SGS-Thomson does not yet have the critical mass needed to assert itself against the world giants in the industry. The firm run by Pasquale Pistorio posted operating profits in the second quarter of this year, breaking a long streak of losses. It is beginning to reap the dividends of a "niche" strategy, and is winning real commercial victories in the areas of reprogrammable memories (EPROMS, erasable, programmable read-only memory), microcontrollers, and dedicated circuits (ASICs [application specific integrated circuits]). If SGS-Thomson's future is not assured, at least it is looking brighter.

On the other hand, it would be hard to find anything more cryptic than the text of the government's communique on the future of TCE. The latter's situation, the text laconically states, "will be reexamined to provide an initial assessment of the recovery plan initiated by its new president Alain Prestat, and in light of the changes in consumer electronics markets and the consequent strategic prospects." Recovery? Following a four-month audit, Mr. Prestat gave himself eight years this spring to bring it to fruition (see LE MONDE, 9 May). Two years to stop the tumble in sales (down 14 percent between 1989 and 1991), four to restore the company's profitability (Fr5.2 billion in cumulative losses in two years), and a total of eight to make the company a force with new products. A Herculean task.

As for the market, it is simply wretched, and expected to remain so. With 18 and 14 percent respective shares of the American and European television markets, TCE is getting clobbered by stagnant consumption. According to the European Association of Consumer Electronics Manufacturers, sales of television sets in Europe dropped two percent last year and sales of tape recorders five percent. And initial figures suggest that 1992 will be just as rugged, [with annual results] aggravated further by an annual drop in prices of about 10 percent.

Thus, if simply achieving sales growth again promises to be a challenge, breaking even in such a market now seems totally out of reach. TCE is carrying debt of over Fr12 billion—some even say Fr15 billion—and must disburse Fr1.2 to Fr1.5 billion a year in interest expenses. With a turnover of Fr31.1 billion in 1991, TCE has no chance of redeeming its debt. That means the electronics group cannot get out of the red without increasing its capital or "absorbing" a portion of its debts.

SECAM Against the D2 MAC

"When combined with Thomson Co., TCE has no balance-sheet problem," an individual familiar with the case still assured us on Wednesday. That would seem true enough, since the Thomson group should be able to absorb its losses more easily—at least at first—once freed of the financial requirements of its components branch. But, "the policy is cosmetic," countered an official, pointing out that TCE's former CEO Bernard Isautier had presented the outlook for his subsidiary at a Thomson Co. board of directors' meeting shortly before his departure. Isautier looked at the company's prospects as a function of how much fresh money could be raised.

With Fr9 billion, TCE had a chance to remain among the big players of the consumer electronics industry (TCE ranks fourth internationally, after Japan's Sony and Matsushita, and the Philips-Grundig team). The group could invest in high-definition television, video, and the much-talked-about "multimedia" products. With only Fr6 billion in fresh money, recovery was slower and required a favorable economic climate. With only Fr3 billion, TCE was forced to give up some of its investments.

With nothing.... Of course, the government swears it would never abandon the company to its fate. Yet for the second time this week it has made decisions that run counter to TCE's immediate interests. Sunday evening the government announced a decision favoring the use of the SECAM standard on the Telecom 2A satellite, thus "sacrificing" the rapid strides that might have been made by the new D2 MAC television standard, in which TCE has invested heavily (see LE MONDE, 8 September). On Thursday, it favored the strategic industry of components.

The fact is, the government's entourage had been wondering for months what the state's "missions" were. Should it really "make television sets in America and southeast Asia?" Nearly 60 percent of TCE's 45,000 employees live in Malaysia, the United States, and Mexico. Only 4,500 of them are employed in France. Without running the risk of a social protest, it was difficult for TCE to influence the government's choice.

France: Aeronautics Industry Decreases Production

92WS0810B Paris LE MONDE in French 13-14 Sep 92 p 17

[Article by special correspondent Martine Laronche: "The Aeronautics Industry Goes on a Recession-Inspired Diet"; first paragraph is LE MONDE introduction]

[Text] Faced with a depressed market, aeronautics manufacturers are slowing their rate of production. The recession is clobbering airlines, and manufacturers do not foresee orders returning to normal for another two years.

The mood is somber in the hallways of the Aeronautics Show, which is being held in Farnborough, England from 6-13 September in off-year rotation with the Bourget Show. Fewer manufacturers have made the trip. Customers are scarce. Aside from a persistent rumor about Dassault's chances of selling Mirage 2000-5s to Taiwan, there are no announcements of spectacular orders.

Manufacturers are desperately searching the skies for signs of a major recovery in traffic. After a historic 4 percent drop in international traffic in 1991, the shivers recorded since the beginning of 1992 are far from sufficient. On the whole, manufacturers see no change on the horizon before 1993—or rather, 1994. "This may be the worst storm in our history," observes Brian Row, the president of General Electric's engines division. "We don't expect to get back to a normal order situation for another two years." And the American giant is toying with the idea of cutting more than the 2,800 jobs it had already planned to in 1992.

A Drop in Orders and Postponed Options

Yet while the airlines are hurting, aircraft and engine makers are still having their dessert first. The bumper crop of orders written in 1988 and 1990 guarantees aeronautics manufacturers work for four to five years. Boeing will deliver 442 airplanes in 1992, which will be a record year. Airbus Industrie still has five years of production ahead, with orders for 900 planes.

But orders plunged last year, and have shown hardly any signs of picking up. The Seattle manufacturer has written 147 orders since the beginning of the year, and will have a tough time reaching 1991 levels (257 orders), despite the fact that 1991 was a year marred by the Gulf War. The other American aircraft maker, McDonnell Douglas, kept a very low profile during the show. The company received only 38 orders for planes in 1991, and its agreement with Taiwan Aerospace to sell 40 percent of its civil airplane manufacturing activities is dead in the water.

Postponed options and deliveries—even cancelled orders—are becoming more and more frequent. Northwest Airlines has just announced its decision to delay delivery of 16 Airbus A-330s because of the weak air

transport market, after postponing the delivery of 25 Airbus A-320s earlier in the year.

This flying without instruments does not make aircraft manufacturers very happy. They have already begun or announced slowdowns in their production schedules, and have started to operate at reduced capacity until better days return. Production of Boeing 737s will drop from 21 to 14 a month between now and the end of the year, and production of 757s from 8.5 to seven in one year. Dassault Aviation is considering cranking down production of its Falcons. "We will be forced to alter our production plans before the end of the year," confirms the managing administrator of Airbus Industrie, Jean Pierson.

The European consortium reports 79 firm orders since the beginning of the year, but still hopes to break the 100-order barrier as it did in 1991. Airbus's rate of deliveries should be roughly the same in 1992 as it was the previous year. The prevailing uncertainty in the industry is not propitious for launching new models. Airbus Industrie will not decide whether to launch an Airbus A-319 (a shortened version of the A-320) before the end of the year, even though its managing administrator describes himself as "very optimistic" about the outcome of efforts to seek out new markets.

The Effects of the Dollar's Decline

Meanwhile, Boeing is thinking about a model to compete with the Airbus A-320 and the future Airbus A-321, using the 737 as a starting point. The plane may be equipped with a new engine derived from the CFM56s that CFM International—a joint venture formed by the French company SNECMA [National Aircraft Engine Research and Manufacturing Company] and the American enginemaker General Electric—has begun to study. But here again, customers—that is, the market—will decide whether or not the scheme is opportune.

In these "lean times," competition between manufacturers is intense. Airbus Industrie won the United Airlines order for 100 Airbus A-320s, and is now negotiating with the express delivery service UPS [United Parcel Service] for the sale of 35 cargo version A-300-600s. The drop in the dollar has not made things any easier for European manufacturers. Each time the dollar loses 10 cents, Aerospatiale and SNECMA lose from 140 to 150 million French francs [Fr], according to the French Aeronautic and Space Industries Group (GIFAS).

"SNECMA's adaptation policy includes a "currency coverage" component that has enabled us to stabilize the French franc value of our turnover, two-thirds of which is calculated in dollars," observes Gerard Renon, the company's new president. "But if the obvious undervaluation of the dollar were to continue, it would throw all of Europe's industry into a major financial disaster, and we would naturally be directly affected."

Cautious Bankers

In this brutal climate, Europeans are becoming doubly vigilant about possible unfair practices stateside. After the July compromise reached by the EC and the United States on government subsidies for the construction of civil airplanes, Airbus's managing administrator believes that, as easy as it may be to track direct subsidies such as the Europeans enjoy, it is very difficult to track indirect ones. The latter are channeled through research programs and military contracts. "The European Community must be very vigilant in keeping track of such subsidies," he insists.

Another deep concern of aircraft makers is the loss of confidence among bankers in the airlines' ability to show a profit again. "Carriers are waging a ferocious war over the North Atlantic, and prices are too low to enable airlines to balance their operating [expenses]," confirms a French banker. "Companies that rent planes are beginning to postpone orders and cancel options. Japanese banks are infinitely less aggressive in their proposals. Today they are offering virtually the same margins we are." Bankers are becoming more selective, and are more inclined to show interest in "flagship companies" or air-transport giants. "We want to work with the future survivors," the financier flatly states. "To lose today so that we can win tomorrow."

Unless the recovery materializes, the airlines' woes will soon have a more powerful effect on manufacturers. Although France's aeronautics and space industry should easily amass more orders in 1992 than it did in 1991 (the forecast is Fr84 billion, or an increase of 7 percent), the number will come nowhere near to offsetting last year's fall of 30 percent, says GIFAS. According to its president Henri Martre, "the climate is still unfavorable," both in the civil and military sectors, the latter having been very hard hit by appropriations cuts. In 1994, the turnovers of the companies that belong to GIFAS could drop 20 to 25 percent over 1991.

The aircraft manufacturing industry employed 120,700 people in France in 1990. The figure of 30,000 job cuts between now and the end of 1994 seems to match the forecasts of declining activity. Subcontractors should take a drubbing, as these tough times prompt order givers to bring as many activities as possible back in house. "We will have to wait until world leaders get the economy going again. Right now, there is a distortion between Europe, intent on combatting inflation, and countries such as Japan which are experiencing growth," says Henri Martre. "The French aeronautics industry must form alliances," he continues in a plea for European collaboration.

Boxed Material: The French Military Sector Ailing Too

"The military activities" of the French aerospace industry "are in sorry shape." Orders in 1991 dropped 21 percent over 1990. The observation is made by Bernard Nicolas, the general delegate of the French Aerospace and Space Industries Group (GIFAS), in a

report on the activities of the military branch that has just been made public. "The United States's domination" in the world is partly responsible for the situation.

"Due as much to the weakness of the world market—the Gulf War did not generate anywhere near the number of orders expected—as to the systematic decline in defense budgets in western countries, military manufacturing is hurting. And yet," notes Mr. Nicolas, "some forecasts show a need to replace as many as 9,700 combat and training planes during this decade."

"A look at the status of combat planes shows a gap between the obsolescent planes developed in the sixties and seventies and the arrival of new-generation planes that will become operational starting in the late nineties. Consequently, new planes will represent only 15 percent of all the planes to be manufactured over the next 10 years."

The Omnipresence of the Americans in the Middle East

"In this niche, as in the military transport plane niche, American-designed planes predominate and have invaded over half of the world market. The Gulf War and the breakup of the USSR," adds the GIFAS general delegate, "have substantially shored up America's commercial presence—even omnipresence—in the Middle East. While sales of American weapons came to $18.5 billion in 1990, and $11 billion in 1991, they should climb to $26 billion in 1992."

Military orders for planes, helicopters, and missiles received in 1991 by the French aeronautics industry totaled Fr47,139 million, or a decline of 21 percent over 1990. The share of exports was 28 percent.

According to Mr. Nicolas, civil orders will not be able to offset the losses of the military sector. That is why GIFAS believes that "the [industry's] results, both in terms of sales and personnel, suggest a cumulative decline of as much as 25 percent by 1994."

European Fiber Optic Market To Double in Five Years

92WS0812A Chichester INTERNATIONAL TELECOMMUNICATIONS INTELLIGENCE in English 14 Sep 92 p 3

[Text] According to a report just issued by market analysts Frost & Sullivan, rapid deployment of optical fibre technology in the local loop and in local area networks will result in the European market for opto-electronic components and fibre cable almost doubling over the next five years.

The report estimates that in 1993 the European market for fibre-optic communications components will be worth US$885 million. It will grow significantly, mainly through the expansion of the public telecommunications network and the buoyant LANs market.

But the fastest short-term growth rate will be in Germany, including the former East Germany, so that it will become the largest national market in 1993. The UK is, however, expected to overtake again by 1997 when it will be worth over US$830 million.

The French market will grow at a similar rate to the UK and, by 1997, the three key national markets of the UK, Germany and France will account for over two-thirds of the total European market value.

Throughout Europe, this growth will be fuelled by an increasing demand for data interchange and fibre-optic based Local Area Networks in commercial premises. Other factors include deregulation of European communications networks with new commercial operation offering services in competition with the national telecommunications administrations. Extension in the use of fibre from trunk routes to offices, factories and homes is also identified in a study on the prospects for seven fibre-optic communications product categories within six key application areas throughout Eastern and Western Europe.

The biggest product category is single-mode fibre-optic cable with 1992 sales estimated at US$404 million and rapid growth up to 1997 should result in a market worth US$754 million. Almost all of this will be in public switched networks and undersea systems. The second biggest product group, transmitters, receivers and passive components will also show significant growth because of German telecommunications expansion.

European Fibre-Optic Markets (US$m)

	1992	1997	cagr	overall growth
Transmitters & Receivers	181.1	402.3	17.3%	122.1%
Passive components	7.2	17.3	19.2%	140.3%
Splicers & Splicing kits	11.3	21.3	13.5%	88.5%
Test equipment	94.4	146.9	9.2%	55.6%
Multimode cable	102.6	228.7	17.4%	122.9%
Single mode cable	404.1	753.8	13.3%	86.5%
Total	864.6	1,703.6	14.5%	97.0%

Source: Frost & Sullivan

The smaller multimode fibre market, estimated at US$102 million in 1992, will have one of the highest growth rates due to its continued use in LANs. There will also be higher growth in small hand-held test sets for servicing the LANs market, but these are relatively low-cost items.

Meanwhile, test equipment will have a comparatively low growth rate as extra equipment will not be needed pro rata with the expansion of public switched networks and the local loop.

The largest applications market throughout the forecast period will be the public switched network, estimated at US$485 million in 1992. Highest growth, but from a very low base, will be in the local loop, forecast to grow by over 400 percent as a result of German investment.

LANs will show consistently high growth from their 1992 estimated US$156 million value as more computers, and especially smaller desk-top and portable models, come into service.

Metropolitan area networks (MANs) and CATV will have slower growth but lowest expansion will be in the defence and aerospace sector because of declining defence spending. This market will rise only slightly above its 1992 value of US$48 million.

Report E1658 costs US$3,800 from Frost & Sullivan Ltd on +44 (0)71 730 3438.

R&D Spending in Europe, Japan, U.S. Compared

92WS0812C London INTERNATIONAL MANAGEMENT in English Sep 92 pp 66-69

[Article by Michael Kenward: "Bottom of the Big League"; first paragraph is INTERNATIONAL MANAGEMENT introduction]

[Text] The UK R&D Scoreboard, sponsored by Britain's trade ministry, is designed [passage illegible] companies into spending more on research by showing how much leading businesses in other countries invest in it.

Japanese companies see spending on research and development as something of a virility symbol; their executives talk proudly of the percentage of turnover that they reinvest in R&D. This is no idle boast. The figures confirm the proclamations, although not as obviously as the claims might suggest.

Japan's 10 biggest spenders on R&D put £13.3 billion (ECU18.3 billion) into it in 1991—5.5 percent of their £237.7 billion of sales. In the UK, the top 10 R&D spenders devoted £3.9 billion to research out of sales of £182.1 billion, or just 2.1 percent of turnover. Only five countries—France, Germany, Japan, the U.S. and the UK—have more than 10 companies on the list of the world's 200 biggest spenders on R&D, with the UK coming bottom of this big league for spending as a percentage of sales. Japan, though, was not top. That honour went to Germany, which devotes 6.8 percent of sales revenue to research.

The figures come from UK R&D Scoreboard, an analysis of annual reports and accounts filed by UK companies. The annual survey—this is the second—is paid for by the Department of Trade and Industry (DTI) and compiled by Company Reporting, an Edinburgh-based research organization. This year's report also carries an international ranking of the top 200 corporations worldwide by R&D spending, based mainly on data from credit rating agency Standard & Poor's.

The DTI commissioned the scoreboard because of growing concern over the reluctance of UK companies to invest in R&D. To a certain extent the ministry hoped that a poor showing on the scoreboard would shame them into spending more. The first task, though, was to persuade businesses to declare R&D activities in their annual reports. While recommended standards on accounting practice call for accounts to detail R&D spending, not all have done so. Last year's scoreboard may have had some impact: more UK companies are now declaring it.

The first scoreboard also found companies stating their R&D spending in different ways: several included money spent on R&D on behalf of the government, notably for defence-related research. This practice had ceased by the time the second scoreboard was compiled.

Any analysis of such figures clearly must treat them with caution: structural differences make direct comparisons awkward. Of the UK's top 10 companies, three—Glaxo, SmithKline Beecham and Wellcome—are in pharmaceuticals, an industry that is notoriously R&D intensive. For the UK as a whole, businesses in the health care sector spent almost 7.3 percent of turnover on R&D, a higher figure by far than any other sector, and four times the all-industry average. But while Germany's top 10 also includes three pharmaceutical companies, not one of Japan's top 10 is in this sector, making its higher R&D spending even more remarkable.

Why is it that companies in Japan and Germany appear happier to invest in R&D? Akio Morita, chairman of Sony, has clear views on the subject. As part of its campaign to promote corporate R&D, the DTI invited Morita to give the first UK Innovation Lecture, at the Royal Society in London in February. He used the opportunity to criticize, albeit politely, the management of UK industry.

In Japan, Morita said, 'you will notice that almost every major manufacturer is run by an engineer or technologist.' 'But in the UK,' he added, 'some manufacturers are led by chief executives who do not understand the engineering that goes into their own products. This strikes me as very curious. Though I have a great deal of respect for accountants and financial professionals, I do not believe they should be at the helm of industry.'

Morita was talking to a British audience, in Germany he could not have made the same criticism. There, too, engineers are on top rather than on tap. Germany companies also have a different attitude to the relationship between R&D spending and the interests of shareholders. The UK's 10 biggest R&D spenders' combined bill of £3.9 billion compares with the £5.6 billion they handed out in dividends last year. In Germany the situation is reversed: £10.3 billion is spent on R&D and just £1.5 billion on dividends.

Gottfried Bruder, general manager of the London branch of Germany's Commerzbank, speaks of British 'short-termism' with some amazement. He believes that 'the

entire financial culture in the UK and its effects on industry are such that, taken together, they constitute a strong disincentive for investment in any form that cannot almost instantly provide returns pleasing to the stock market'.

Short-term earnings receive far too much attention in the UK, Bruder says, with companies going so far as to pay dividends out of reserves. 'I could not conceive of a German company committing the folly of voluntarily depleting the reserves to pay dividends. There is probably a direct link between dividend payments and R&D expenditure, or for that matter training expenditure. He adds that programmes which bear fruit only in the long term—such as R&D—are often prime targets for cost cutting.

German enterprises certainly appear less ready than their UK counterparts to pass on cash to shareholders. This shows up in the performance of the top 10 spenders, and direct comparisons between comparable companies show a similar pattern. While GEC, the UK electrical giant, invested 7.2 percent of its sales revenue in R&D, for example, the figure for Siemens was 10.8 percent. Each company distributed more than £240 million in dividends, but Siemens's profits were 58 percent higher than GEC's. Siemens has increased its R&D spending by 11 percent or so each year for the past five years.

With R&D operations in 23 countries, Siemens is also one of the few European companies that can match Japan and the US in global research and development spread. This reach owes much to its overseas acquisitions. But while it has built up a global research presence almost by default, Japanese companies see the creation of such facilities away from home as a natural extension of their moves to set up production plants abroad.

In some sectors of industry it is difficult to detect national differences. All drug companies, wherever they are based, have to spend a large percentage of turnover on R&D to maintain a steady stream of new products. In the chemicals sector, the other industry in which the UK can still claim to be at the frontiers of science, ICI, Britain's biggest corporate spender on R&D, invested 4.8 percent of its turnover in the process. This compares with 6.1 percent for Hoechst and 4.4 percent for BASF, the two largest German chemicals companies, both of which spent significantly more in cash terms than ICI.

It is this sort of comparison that the DTI hopes to encourage. When he launched the first scoreboard in 1991, Peter Lilley, then trade and industry secretary, said that the listing 'should now stimulate investors to question companies who appear to be underinvesting in R&D'.

Some commentators feel that too much talk of R&D spending is unwise because it could alert predators to potential takeover candidates. Companies with a large R&D portfolio are, so the argument goes, vulnerable to attack by those with a shorter-term view. Bruder describes the demands of institutional investors for ever more information from companies as 'like turkeys discussing how to grow their necks longer to make Christmas easier for the butcher'.

While the scoreboard's snapshot of R&D spending in 1991 is a valuable contribution to the discussion of the role of industrial research, it says little about changes in corporate research. A number of years' statistics are needed for that. If nothing else, the world recession must have distorted recent figures, although there is little sign so far that falling profits have prompted widespread cuts in R&D.

Next year's league tables may paint a different picture. While Japanese companies increased their R&D spending by 13 percent between 1990 and 1991—more than twice the increase in the UK and Germany in the same period—Yasuo Nakajima, a director of Nissan and general manager of the Nissan Research Centre at Yokosuka near Tokyo, forecasts that research budgets will level off. 'The cost of salaries is more than 50 percent of R&D costs,' he says. 'Every year the cost of labour will go up. We have to be more creative and do more research despite having no increase in the corporate research budget.'

Nissan's answer is to bring to R&D the 'lean production', customer-oriented techniques it has applied to manufacturing. It is bringing researchers nearer to the production line, making the divisions responsible for product planning and research work together and strengthening 'research networks' with suppliers.

This blurring of the dividing line between R&D and production introduces an important 'health warning' that has to be attached to any statistical analysis of R&D spending. As well as the provisos about different ways of accounting—US companies, for example, include in R&D calculations more of their product development costs than is the practice in Europe—there is the issue of productivity.

Counting money tells us little about the effectiveness of the researchers spending that money. If Morita is right about UK companies and the absence of technically competent people at the top, it seems likely that managers in Germany and Japan have a better understanding of what their R&D departments are up to, and are therefore in a better position to exploit the researchers' work.

Company R&D Spending by Country

Company	Activity	R&D spend £million	Sales £billion	R&D % sales	Profit (loss) £million	Dividends £million
UK						
ICI	Chemicals	596	12.5	4.8	843	381
Glaxo	Pharmaceuticals	475	3.4	14.0	1,283	420
Shell	Oil & gas	472	74.4	0.6	5,440	2,054
GEC	Electricals, electronics	435	6.0	7.2	818	245
SmithKline Beecham	Pharmaceuticals	432	4.7	9.2	1,002	211
Unilever	Food, consumer	428	23.2	1.8	1,792	420
BF	Oil & gas	308	32.6	0.8	1,203	904
British Aerospace	Aerospace, motors	283	10.5	2.5	(81)	84
BT	Telecoms	243	13.1	1.8	3,075	818
Wellcome	Pharmaceuticals	229	1.5	14.3	403	85
Total		3,879	182.1	2.1	15,778	5,632
FRANCE						
Alcatel Alsthom	Electricals	838	14.9	5.8	906	139
Rhone-Poulenc	Chemicals	545	8.1	6.7	387	42
PSA	Motor vehicles	480	16.6	2.8	1,452	82
EDF	Electricity	488	18.0	2.9	13	0
Societe Generale	Finance	377	18.1	2.1	1,808	316
Elf Aquitaine	Oil & gas	377	19.5	1.9	1,909	240
CSF Thomson	Electricals	331	3.8	8.7	250	78
Machines Bull	Computers	308	3.6	8.6	(770)	0
L'Oreal	Consumer	188	3.4	4.8	356	41
Sextant Avionique	Aerospace	162	0.5	25.9	23	3
Total		4,052	104.5	3.8	5,438	941
GERMANY						
Daimler-Benz	Motor vehicles & parts	2,950	33.5	8.8	1,418	213
Siemens	Electricals, electronics	2,781	25.7	10.8	1,204	241
Hoechst	Chemicals	1,011	18.8	8.1	902	245
Bayer	Pharmaceuticals	954	14.7	6.6	1,188	292
VW	Motor Vehicles	881	23.9	3.7	842	104
BASF	Chemicals	727	16.4	4.4	742	241
Schering	Pharmaceuticals	339	2.2	16.2	184	31
Mannesmann	Engineering	240	8.8	2.8	220	88
SEL	Electronics	224	1.3	17.1	1	0
MAN	Mechanical eng.	176	5.7	2.6	285	55
Total		10,303	149.5	[illegible]	5,968	1,518
US						
General Motors	Motor vehicles	3,153	85.4	4.5	(3,155)	539
IBM	Computers	2,678	34.7	7.7	54	1,454
Ford	Motor vehicles	1,296	47.3	4.2	(1,385)	496

Company R&D Spending by Country (Continued)

Company	Activity	R&D spend £million	Sales £billion	R&D % sales	Profit (loss) £million	Dividends £million
AT&T	Telecoms	1,657	33.8	4.9	472	863
Digital Equipment	Computers	883	7.4	11.9	(277)	0
Eastman Kodak	Scientific & photo equipment	800	10.4	7.7	6	347
Hewlett-Packard	Computers	783	7.8	10.1	603	84
Boeing	Aerospace	758	15.7	4.8	1,150	183
GE	Electronics	750	32.3	2.3	3,447	968
Du Pont	Chemicals	895	20.7	3.4	1,509	603
Total		14,163	275.5	5.1	2,483	5,597
JAPAN						
Hitachi	Electronics	2,090	32.8	6.3	2,394	153
Toyota Motor	Motor vehicles	1,231	41.9	4.4	3,020	273
Matsushita Electric	Electronics	1,535	28.1	8.5	2,543	111
Fujitsu	Computers	1,404	12.8	11.1	851	77
Toshiba	Electronics	1,273	20.8	8.1	1,103	136
NEC	Electronics	1,190	15.7	7.8	570	85
NTT	Telecoms	1,160	26.6	4.4	2,142	332
Nissan Motor	Motor vehicles	1,001	25.4	3.9	545	149
Sony	Electronics	876	15.4	5.7	1,124	72
Honda	Motor vehicles	826	15.3	4.5	852	57
Total		13,225	237.7	8.5	14,744	1,425

Source: UK R&D Scoreboard 1991

Who spends most on R&D?

Country	R&D spend £billion	Sales £billion	R&D % sales	Dividends £billion
Germany	10.3	149.5	5.8	1.5
France	4.0	104.5	3.8	0.9
UK	3.9	162.1	2.1	5.6
U.S.	14.2	275.5	5.1	5.8
Japan	13.3	237.7	5.5	1.4

Source: UK R&D Scoreboard 1991

France's Vitec Expands Multimedia Image Activities

92WS0828B Paris L'USINE NOUVELLE in French 10 Sep 92 p 28

[Article by Jean-Pierre Jolivet: "Vitec Penetrates the Multimedia Market"; first paragraph is L'USINE NOUVELLE introduction]

[Text] Vitec wants to parlay a board that transforms computers into multimedia workstations into a position as a market leader.

Things are speeding up for Vitec, the small French company that specializes in image compression and coding techniques. The EC has just selected the Clamart firm to head the multimedia portion of the Transit research program, which includes such big-name electronics firms as Matra Communication and Siemens. Transit is a RACE project, whose aim is to develop the vital image-transcoding systems that will be used in the videophones, HDTV, and other multimedia systems of tomorrow.

The founding general director of Vitec is Philippe Wetzel, a former Matra Espace employee who worked on the artificial vision system of the future European spaceplane Hermes. With that kind of know-how behind him, Mr. Wetzel is not shy about his ambition, which is to become one of the major players in the market for computer micromedia boards.

It is a sharp industrial shift for the 12-person company (including nine engineers), which earned 4 million French francs [Fr] in sales in 1991. Indeed, in the four years it has existed, Vitec has built up a solid reputation in image coding and data-compression algorithms by working for several big electronics groups. Development and consultant business will again account for 70 percent

of the its sales this year, despite the company's precocious marketing of digitalization boards starting in 1989.

The situation has evolved rapidly over the last few months: The multimedia market is taking off. "Our income distribution will reverse itself in 1993. This year we will triple our hardware sales," predicts Philippe Wetzel, whose goal is to top the Fr10 million sales mark next year.

To meet that challenge, Vitec is stepping up its offensive. The company is preparing to market a board using MPEG [Motion Pictures Expert Group] compression standards that can transform microcomputers into authentic multimedia work stations without using up much memory. The system especially targets applications in medicine, industrial process control, meteorology, and the consumer market (role games, educational videos, etc.). Vitec is counting heavily on the product to move ahead of the competition from Taiwan, America's Outside Technologies, Britain's Digithurst, or Germany's Fast Electronic.

This is pushing Vitec to develop American and European distribution networks without delay. For its managers know that, to withstand the inevitable price war, they will have to sell in quantity—another challenge for the young small business.

EAST-WEST RELATIONS

German Scientific, Technical Cooperation With CIS States Reviewed

92MI0697 Bonn TECHNOLOGIE-NACHRICHTEN PROGRAMM-INFORMATIONEN in German 7 aug 92 p 1-12

[German Government Report on Scientific and Technical Cooperation with the Republics of the Commonwealth of Independent States (CIS), and with Russia in Particular—Status and Future Prospects]

[Text]

1.1. Legal Basis for Scientific and Technical Cooperation With the CIS Republics

Research and development (R&D) cooperation with the CIS republics is based on the agreement signed in 1986 and in force since 1987 between the governments of the Federal Republic of Germany and the Soviet Union on scientific and technical cooperation, and the departmental agreements pursuant thereto on:

- STC on peaceful uses of nuclear energy (1987);
- Cooperation on health and medical science (1987);
- Cooperation on agricultural research (1987);
- STC on exploration and exploitation of space for peaceful purposes (1988).

These agreements, which, owing to the dispute over Berlin and Germany as a whole that then dominated and determined the relationship with the Soviet Union, were only reached after extremely tough, long-drawn-out negotiations and after Secretary-General Gorbachev's rise to power, created the only opportunity of progressing beyond the limited exchange of scientists, as practiced with difficulty by the DFG [German Research Association] and the AvH [Alexander von Humboldt] Foundation, to the stage of joint project work. Owing to the Soviet system's rigid command structure and the East-West confrontation, nothing could be achieved without agreements at state level.

Since then, cooperation has mainly and increasingly taken the form of joint research projects, around 90 percent of such work being carried out with Russian establishments and the remainder with facilities in the Ukraine and Armenia, and as far as space research is concerned, with Kazakhstan.

Following the break-up of the Soviet Union, Russia became the legal successor to these agreements as well. Cooperation with institutes in the Ukraine, Armenia, and Kazakhstan is also going ahead on a provisional basis (and without formal agreements) on the strength of the former agreements with the Soviet Union and under the projects arranged before 1992.

The joint research agreed upon is proceeding by mutual agreement between the parties concerned, and will be extended wherever possible.

1.2. Political and Economic Reform, and Resulting Changes in R&D and STC

The reform process initiated in the Soviet Union in the middle of the eighties, which was based on the survival of socialism, though with certain democratic, partially market economy-oriented features, took on a new shape with the collaspe of the eastern military and economic bloc and rejection of the communist system, requiring new structures for scientific and technological work, both within the country and in international cooperation. The present situation in the CIS republics, however, is marked more by spontaneous developments than by the planned evolution of a market economy-based democratic order to replace the old central command structures. In addition, there are major economic and organizational problems in R&D institutions in the public sector and in industry.

Despite the countries' great wealth of natural resources and significant intellectual potential, economic reconstruction will be a long and painful process. The difficulties are aggravated by the fact that the Soviet Union's ethnic diversity, with over 100 different nationalities, had not removed, but merely suppressed, conflicts between nationalities.

The Commonwealth of Independent States, which brings together 11 of the former Soviet republics*, has only (*Russia, Ukraine, Belarus, Moldavia, Armenia, Azerbaijan, Kazakhstan, Kirgizstan, Uzbekhistan, Tazakhstan, and Turkemenistan, Georgia intends to cooperate with the other republics under bilateral agreements; the Baltic republics of Latvia, Lithuania, and Estonia, which became independent states before the break-up of the Soviet Union and the establishment of the CIS, are not covered by this report) very limited power to act. Agreements signed at the end of 1991 by the majority of the CIS republics on interstate scientific technical, and space cooperation have still not taken effect.

The CIS republics mainly deal separately with other countries too, emphasizing their national individuality and sovereignty.

Political developments have further aggravated the existing manifestations of crisis in the economy, which was entirely center-oriented and marked by distinct imbalances and large-scale dependence on the largest republic, the RSFSR [Russian Soviet Federated Socialist Republic]. Old structures collapsed before new ones could be created to replace them.

The same applies to science and to technological development in the CIS republics. For example, a more or less comprehensive research structure exists only in Russia, and, to a more limited extent, the Ukraine; and even in these two republics it is predominantly centered on Moscow, St. Petersburg, Novosibirsk, and Kiev, Georgia and Armenia do have strong capabilities in certain areas, such as the humanities and basic physics research. In the other republics, science plays a mainly regional role for instance in tapping territorial raw material sources (e.g., petroleum in Azerbaijan and rare metals in Kirgizstan) or in supporting local industries (e.g., applied cybernetics in Belarus). Certain institutions do have a suprarегional role: For example, the rocket launching site in Baikonur, Kazakhstan, and the radio telescope in Uzbekhistan, are used mainly by the other major republics, especially Russia; their future has yet to be decided.

The balance between industrial, academic, and university research is as uneven as is its content. Various sources suggest that over 50 percent of the total research capacity used to be taken up by the arms industry. Nonmilitary academy research and university research each accounted for about 20 percent of the remaining research capacity, the remainder being absorbed by nonmilitary industrial research. There is a similar imbalance between the relatively large potential in terms of human resources (Soviet statistics show around 4 million people, including around 1.5 million scientists employed in nonmilitary R&D) and the somewhat modest funding and fitting out of R&D facilities. For example, American expenditure on high-temperature superconductivity is approximately equal to the former Soviet Union's entire nonmilitary research budget.

Over and above these imbalances, science in the CIS republics primarily faces problems that derive from the communist system itself.

On the one hand, the greater freedom enjoyed by scientists following the changes currently in progress makes for increasing opportunities for joint research; whereas on the other hand, the worsening economic situation is constantly reducing what were already very limited funds available for research.

The effectiveness of science is constantly falling, and marked signs of disintegration are appearing. Many research institutes are having difficulty paying salaries, thus endangering the survival of productive research teams. For example, the Russian Academy of Sciences has no foreign currency available for 1992 to finance purchases of western literature. There is a significant tendency to emigrate among leading scientists: Out of 1,100 academicians, 300 are estimated to have left the country to work abroad during 1989-90 (no figures are available for 1991), accounting for a large proportion of those from the former Soviet Union able to compete in the international marketplace.

Additional problems arise from the fact that apart from Russia, the republics largely lack national policy-making, management, and research coordination structures, with the result that the process of organizing and directing research programs must first be set in motion.

This present situation creates the urgent need to complement joint research by taking active steps to support and stabilize the research forces that are being jeopardized albeit only temporarily.

1.3. Areas of Emphasis in STC

The preferred channel for STC is the joint project in areas where advances in R&D are mutually beneficial and where both sides have research capabilities of comparable quality.

Over 180 projects are currently under way representing a roughly threefold increase since the agreements were signed with the original lists which had taken a long time to draw up. Greater familiarity has convinced German partners in these projects of the high levels of expertise in areas such as space and materials research and basic research.

The main topics derive primarily from the four departmental agreements and relate in particular to space research, cooperation on the peaceful exploitation of nuclear energy, including reactor safety, and agricultural and health research.

In addition, joint work on high temperature superconductivity, marine and polar research, and the geosciences has developed very satisfactorily. There are also good prospects in laser engineering (on which an agreement is to be signed during the ministerial visit), hypersonic engineering, environmental research, and biotechnology.

The creation of these research partnerships also took due account of the commitment given in the Treaty of Unification to honor international agreements entered into by the former GDR. Wherever research under the GDR's 60 science and technology cooperation agreements with the Soviet Union has proved of mutual interest following unification, the Federal Republic of Germany has made appropriate commitments into agreement. New areas of cooperation either have been or are being opened up in some sectors, and research institutes in the new laender are being fully involved in the joint work.

For example, the BMFT [Federal Ministry of Research and Technology], building on the GDR's long membership (which terminated on unification) of the United Institute of Nuclear Research at Dubna, Russia, has concluded an agreement, to run initially to the end of 1993, to cooperate with this institute, which was founded to serve the COMECON countries and use its facilities. Around 25 German scientists are currently working there on a long-term basis.

Conversely, institutes in the former Soviet Union are being brought into cooperation with international organizations and associations originally restricted to Western Europe.

1.4. New Requirements and Channels for Cooperation

The changes in the CIS republics resulting from the economic and social reforms are jeopardizing the employment prospects of individual researchers and research teams, and the creation of effective structures out of the R&D personnel, many of whom are highly qualified. There is an obvious danger at this stage of irreversible damage through disintegration and emigration.

These dangers are aggravated by the fact that a large proportion of these researchers work in sensitive areas. In order to forestall emigration by these scientists, and thus the dissemination of their knowledge in other countries, the International Science and Technology Center has been set up in Moscow, on the initiative of Germany and the United States, with the purpose of funding suitable employment for these scientists in the CIS. The center is sponsored by the United States, Japan, Russia, and the EC.

Halting the process of disintegration requires that rapid, unbureaucratic assistance be provided, and the prospect of further employment for the scientists in their own countries. Such assistance must be organized on both a national and international basis, using channels such as:

- Creating or extending special grants programs;
- Allocating R&D contracts to research institutes in the CIS;
- Paying to use large-scale facilities and infrastructure in the CIS;
- Cooperation in marketing the scientific and technical achievements of the CIS, including the establishment of joint ventures;
- Supporting infrastructural measures with a broad-based impact in the CIS republics, such as links to national and international data networks, setting up pilot facilities, and establishing model science and technology parks;
- Supporting further training for scientific managers;
- Providing research equipment and materials out of existing stocks;
- Advice on the shaping of research policy.

The BMFT produced a draft for an aid program along these lines at the beginning of this year. It has also initiated and is playing a leading part, at the international level, in discussions of these problems and the search for aid measures that will solve them, through such bodies as the Council of EC Research Ministers, the group of personal delegates of heads of state and government (SHERPAS), and the Carnegie Group of G7 research ministers.

The feasibility of providing about ECU40-50 million out of the EC Technical Aid for for the CIS program as the European contribution to an international aid program to which non-European countries would also contribute is currently being investigated. A proposal by France, the EC Commission, and scientific circles to launch a campaign in support of CIS science in the form of an international foundation is receiving particular attention.

1.5. Expenditure

The BMFT is providing substantial funding for projects being carried out jointly with CIS establishments.

Spending totaled around 19 million German marks [DM] in 1990 and approximately DM37.5 million (including the costs of the German scientific astronaut's flight in the Mir space-vehicle) in 1991; DM29.7 million have so far been allocated for 1992. These figures include DM6 million per year in 1991 and 1992 for work at United Institute of Nuclear Research at Dubna, Russia, and around DM2.6 million in 1990, DM3.3 million in 1991, and DM4.6 million in 1992 for scientific exchanges.

It must also be borne in mind that not all projects carried out under the agreements receive any state funding. Many measures are funded out of institutes' own resources, for instance out of the basic financing of the major research institutes and the MPG [Max Planck Society] and the budgets of the DFG [German Research Association] and the universities.

The supplementary budget for 1992 provided an additional DM10 million to fund measures capable of providing rapid and effective support for the CIS and Central and Eastern Europe. These measures will include purchasing western periodicals for the Russian Academy of Sciences, stepping up the grants program, and joint projects whose results will contribute to progress in ecology, reactor safety, and information science, and will, first and foremost, support Russia's research potential.

The BMFT is likely to have DM30 million available in 1993, including DM20 million for joint space projects and research capability support.

1.6. Prospects for Cooperation

The future shape of scientific and technical arrangements with Russia and the other CIS republics depends essentially on whether their political and social structures will permit a continuous development process, or whether future cooperation will be impeded by disruption and upheavals beyond the control of STC.

In the event of a positive trend, the following tendencies may be expected to emerge in STC:

- Russia will continue to be the major partner, but it will also be joined by the Ukraine, which is already playing a larger role in joint projects. A gradual transition from the prevalence of individual projects to whole programs in selected areas is conceivable. Cooperation with the other republics will tend to develop along more selective lines in accordance with their individual national features and capabilities.
- In addition to space and materials research, where, compared with other European countries, military research has given individual CIS republics a partial lead that the conversion of the arms industry is now throwing open to non-military cooperation, joint projects will also focus on environmental and energy research.
- A transition from the often rigidly regimented form of cooperation laid down in the agreements to more pragmatic and flexible forms, and the growth of direct contacts between the research institutes, will be possible.
- As and when the interstate agreements on scientific and technical cooperation between the CIS republics enter into force, consideration could be given to tying German cooperation into specific groups of topics.

Finally, however, it should be emphasized that the situation both within and among the CIS republics is still developing dramatically, and can undergo unexpected changes and take new directions at any time; it is thus not possible to assess or even estimate prospects for STC between Germany and the CIS with any degree of accuracy.

2. STC With Individual Republics

2.1. Russia

The following areas are being progressed under the departmental agreements:

Departmental Agreement on Nuclear Energy, 22 April 1987

- fast breeder reactors
- gas-cooled high-temperature reactors
- safety of water-cooled reactors
- treatment of radioactive substances
- controlled nuclear fusion and plasma physics
- research into the basic properties of matter
- radiation protection and the environment.

Number of joint projects: 65

Departmental Agreement on Space, 25 October 1988

- extraterrestial basic research
- exploration of Mars
- high-altitude rocket program for the middle atmosphere
- microgravity research.

Number of joint projects: 52

Departmental Agreement on Health, 23 April 1987

- medical information and documentation
- oncology
- brain research
- cardiology and cardiochemistry
- infectious diseases
- molecular biology and biotechnology in health care.

Number of joint projects: 10

Departmental Agreement on Agricultural Research, 4 May 1987

- biotechnological processes in plant and animal breeding
- plant protection and parasite control in agricultural animals
- research into soil fertility enhancement.

Food Research

Increasing the effectiveness of forestry, agricultural planning and agricultural policy.

Number of joint Projects: 40

In addition, there are 24 individual agreements governing joint projects covering a wide range of scientific fields, particularly high-temperature superconductivity, materials research, electronics and communications, basic physics research, and marine research.

Complex joint projects are under preparation in the following areas, on which consultations have already been held by committees of experts:

- biotechnology
- laser engineering
- nonnuclear energy
- hypersonic engineering
- water supply management.

2.2. Ukraine

The five individual agreements concluded pursuant to the German-Soviet STC agreement in the following areas are to be continued:

- materials research
- molecular genetics
- astrobiophysics.

The same applies to the three viticulture projects arranged to date under the departmental agreement on agricultural research, and to three projects on research into the basic properties of matter set up under the nuclear energy agreement.

Imminent discussions are planned with the relevant state bodies on how cooperation can be increased and with a view to arranging additional joint projects. These are likely to focus on materials research, cybernetics, and space research, in which the Ukraine is particularly strong.

2.3. Other republics

Armenian institutes are involved in three projects on nuclear energy, one on cosmic research, and one on agricultural research. This cooperation is continuing. In addition, consideration is currently being given to Armenian proposals for new projects.

Georgia is involved in two viticulture projects under the departmental agreement on agricultural research. This work is continuing.

In addition, Georgia has officially expressed interest in extending STC with Germany. No concrete project proposals have yet been submitted.

There are currently no scientific or technical contacts with the other republics.

3. Aid for Science in the CIS

In line with the federal government's general "Aid Through Advice" strategy, the BMFT has submitted an aid program for science in Central and Eastern Europe and the CIS states. Subject to apporval by the budget committee, DM10 million will be available for the program in 1992. The government's 1993 draft budget allocates DM30 million for this purpose, including up to DM20 million for space research and engineering. A large proportion of these funds will be spent on measures to be implemented in Russia.

The program aims to maintain and enhance productive R&D forces and to promote the application of advanced technologies and scientific methods to solve urgent problems in the countries concerned. It can thus be seen as a contribution towards stabilizing Eastern Europe's economic and social development.

The program includes the following measures:

- increasing scientific exchanges;
- supplying the Russian Academy of Sciences with scientific journals;
- covering the cost of transporting and setting up used scientific equipment supplied free of charge by German research institutes;
- facilitating access to western specialists information;
- assisting in the maintenance and processing of scientific data bases.

German aid to Russia focuses on the following scientific areas:

- basic research (e.g., nuclear physics, securing data bases on marine research and geosciences);
- environmental research (e.g., transfer to Russia of river reclamation know-how developed in Germany);
- research into reactor safety (e.g., gift of a used supercomputer to the Kurchatov Institute, measures to improve the communications infrastructure, research on improving Russian reactor safety (cf. also section 6));
- Space research and engineering (from 1993).

The awarding of research contracts by German research institutes to CIS institutes, ensuring continued employment for large numbers of scientists and raising standards, is a major aid channel.

BMFT-governed research institutes, some of which already have contacts with Russian colleagues going back over a number of years, have also been quick to use their own resources to support and strengthen Russian research forces, particularly by stepping up scientific exchange programs, donating equipment and materials, and awarding research contracts.

Foundations and research funding organizations have also taken steps on their own to support science in Central and Eastern Europe and the CIS. For example, the Volkswagen Foundation has set up a special program to fund German-Russian cooperation in selected areas of

mathematics and has launched a new funding program for long-term joint science and engineering projects.

German industry is taking steps in the form of joint ventures and licensee companies to facilitate access to western markets by Russian firms with high levels of technological know-how. One medium-sized computer company, for example, is one of several providing equipment for use by Russian scientists.

4. Grant Programs

(a) Alexander von Humboldt Foundation [AvH] 1991 Grant-holders:

1,706 grants were awarded by the AvH, including 190 grants to CIS scientists, 154 of whom were Russians and 25 Ukrainians.

The CIS is the major national group receiving AvH funding.

There are at present 115 CIS grant-holders in Germany, including 98 Russians and eight Ukrainians.

The average duration of an AvH grant is 1.5 years. The smaller number of grant-holders compared with 1991 is partially due to the cycle of visits: The number of grant-holders from this region will be greater than in 1991.

(b) German Research Association

During 1991, a total of 583 CIS scientists visisted Germany, 283 on briefing visits, 146 undertaking research, and 154 by invitation. During the first six months of 1992, in addition to the agreed projects, the following scientific exchanges were totally funded (i.e., including traveling expenses, for which the CIS countries lacked foreign currency): 116 Russians visited the Ukraine.

(c) German Academic Exchange Service (DAAD)

The DAAD funded 152 study visits to Germany by CIS scientists in 1992; 96 German scientists visited the CIS. A new funding period begins in August 1992.

Overall, 400 scientists and students from the former Soviet Union are being funded, including 231 receiving one-year grants and 83 visits of one semester. Around 70 percent of these costs are met by Russia.

(d) Max Planck Society [MPG]

The MPG funded 143 tours by scientists visiting from Russia, and two from the Ukraine in 1991. Figures for 1992 are not yet available, though the trend is upward.

5. Cooperation Between ESA and Russia/CIS on Space Research

Russian space work has taken on a new dimension with the creation of a space agency, which will orient the work more strongly toward the country's economic and social needs, which lie primarily in telecommunications, ecology, resource procurement, and surveying/cartography applications. The Mir station is to be retained, although extra funding will be enlisted from the West. The present 600,000-strong workforce is to be reduced to 100,000.

At this time of restructuring, the Russian space sector needs western support estimated at an annual $50-60 million, for which it is prepared to make payments in kind and supply goods.

Russia's earlier start and high level of investments in the past, have given it a capability that far exceeds the development status of western European systems, particularly as regards launchers and space infrastructure although the technologies are not fully comparable.

There is a virtually unlimited willingness to work with ESA [European Space Agency] and to embark on new joint space projects. In principle, all imaginable forms of cooperation stand open, for instance:

- increased western components and systems;
- utilization of existing ground-based infrastructure;
- introduction of payment in kind;
- licensing agreements (state approval may be required).

No finance is available for closer cooperation with the ESA, for which payments in kind represent the only option.

- There is currently considerable uncertainty in Russian space policy;
- There are considerable structural differences, and neither technology nor working methods are immediately compatible;
- Working together requires considerable adjustments and will therefore take time.

The gradual approach proposed by ESA should not therefore be rejected out of hand. Immediate joint action, e.g., on the HERMES project, requires, at the very least, complex negotiations and a complicated balancing of interests, and will thus take time in view of the prevailing uncertainties.

6. Reactor Safety Research for Soviet-Designed Reactors

Most of the former Soviet Union's nuclear power stations and nuclear fuel cycle plants are located in Russia. In addition, Russia has almost all the scientific reactor safety research and plant development know-how, component manufacturers, and nuclear power station design facilities.

The Soviet Ministry of Nuclear Energy and Nuclear Industry ceased to exist at the end of 1991; a Russian Ministry of Nuclear Energy has been created.

Nuclear power stations are to be run by a state operating company (operator syndicate) under the control of the Energy Ministry committee or Nuclear Energy Ministry

committee that may be created as a new body. In addition to the nuclear power stations, it will have responsibility for the design organizations, research institutes (VNIIAES [Nuclear Power Station Research Institute], NIKIET [Power Station Engineering Research and Development Institute]), commissioning and repair organizations, nuclear fuel cycle companies, and possibly also military nuclear engineering organizations.

These changes will obviously also affect research institutes that were under the direct control of the former Soviet ministry. Consideration is being given to restructuring, and undoubtedly to workforce reductions. No immediate adverse effects on agreed international scientific and technical cooperation are expected, however.

Ministry with jurisdiction: Ministry of Nuclear Energy Minister Michailev

Licensing and supervisory body:

State Committee on Reactor Safety and Radiation Protection, an offshoot from the Soviet State Nuclear Energy Supervisory Committee Chairman Vichnevski

Major Research Facilities:

- Kurchatov Institute, Moscow—IAE (Basic and applied nuclear safety and plant development research)
- Power Station Engineering Research and Development Institute, Moscow—NIKIET (priorities include RBMK)
- Nuclear Reactor Research and Development Institute Dimitrovgrad—NIIAR
- Nuclear Power Station Research Institute, Moscow—VINIIAS (applied research on the safe operation of nuclear power stations)
- Reactor Safety Institute, Moscow—IRS, institute of the former Soviet Academy of Sciences
- Construction Materials Research Institute, Leningrad—"Promotej"
- Central Mechanical Engineering Research Institute, Moscow—ZNITMASCH.

Scientific and Technical Cooperation With International Organizations

There are traditional contacts with the IAEO [International Atomic Energy Organization] in Vienna, of which the Soviet Union was a member. IAEO experts are carrying out safety appraisals in the nuclear power stations as part of an OSART [operational safety review team] mission and are drawing up recommendations for safety improvements for WWER 440/230 plants, scheduled for completion by the end of 1992, under the Extrabudgetary Nuclear Safety Project on the Safety of Old Reactors. These inspections will also be extended to the other types of reactor.

The new state structure does not yet appear to have affected cooperation with the IAEO.

Right at the beginning of the break-up of the Soviet Union, Russia and the Ukraine had already submitted a number of applications for EC funding. These applications concentrated on safety appraisals for WWER 1000 and RBMK blocks, to be carried out under the direction of the Russian or Ukrainian licensing and supervisory bodies working in conjunction with German, French, British, Swedish, and Finnish partners. Some applications cover priority reactor safety research topics and concentrate on adopting and applying modern codes for incident analysis in WWER and RBMK plants.

WANO [World Association of Nuclear Operators], which has set up a center in Moscow for eastern European nuclear power stations, is running a support program to identify and assess areas where the technical safety of WWER 440/230 plants needs tigthening up.

Implementing the recommendations for safety upgrading, many of which have already been submitted, will require considerable resources, which the new states hope will also be provided by the international community, for instance by the EC and in the form of credits from the European Bank for Reconstruction and Development or the World Bank.

France: Sanofi Pharmaceuticals CEO on Franco-Hungarian Venture

92WS0781A Budapest FIGYELO in Hungarian 30 Jul 92 p 25

[Interview with Jean-Francois Dehecq, President of Sanofi, by Eller: "Chinoin is Our Base in Eastern Europe"]

[Text] Sanofi was founded 19 years ago and today it does $9 billion worth of business annually in its three product groups. The number of its employees is 45,000. It is among the top 10 firms of the world in the pharmaceutical industry in regard to both its market share and its research and development achievements.

Jean-Francois Dehecq, president of the French firm Sanofi, having "a little more time in July," met last week with representatives of Chinoin, the AVU and other government offices. Despite the shrinking of the Hungarian and former Soviet pharmaceuticals market he considers the purchase of Chinoin to be a very good investment.

FIGYELO: A year and a half ago Sanofi bought 40 percent of Chinoin and undertook in a contract that it might become majority owner in 1993-94. Why?

Dehecq: Sanofi sent its first representative to Hungary five or six years ago to map out how we might link into the pharmaceutical industry of the eastern European area. Then when the Hungarian regulations and the Hungarian government opened a path for foreign capital we decided in a relatively short time on the purchase of Chinoin. Between the two world wars the Hungarian

pharmaceutical industry already occupied an outstanding place in the European ranking and even today the Hungarian pharmaceutical industry—and Chinoin therein—has significant developmental achievements. A few years earlier we had decided to acquire a share in the pharmaceutical industry in North America and we have established one of our most significant enterprises there; on the basis of similar considerations we decided on Chinoin in the interest of acquiring an eastern European share. Sanofi brings to this marriage its own competitiveness, productivity, technical development achievements and, primarily, its market expertise won on western markets. Chinoin provides its own developmental achievements and its domestic and eastern European markets.

FIGYELO: But this market is increasingly dubious, the ratio of domestic products has decreased even domestically, and the former Soviet markets are insolvent. The situation has developed entirely differently than it might have appeared a year and a half ago.

Dehecq: This is true and naturally everything must be done in the interest of retaining or winning back these markets, by us and by the Hungarian government too, with suitable market protection. But this does not change our initial strategy, that Chinoin is our base in Eastern Europe.

FIGYELO: What does the mutual transfer of developmental achievements mean and how does Sanofi intend to support original pharmaceuticals research by Chinoin?

Dehecq: Chinoin is responsible for getting the original pharmaceuticals of Sanofi registered in Hungary and we are undertaking introduction of the Chinoin preparations on our western markets. One can also imagine that we might transfer developmental achievements born in Sanofi's researach and development laboratories to Chinoin for further development; and this might happen the other way around. Each year Sanofi spends $500-600 million on development. So the only question is how to fit Chinoin into this activity. The important thing is that in those things where Chinoin is the stronger—for example in experimentation on veterinary medicine preparations—they will remain here. What aid can we give to this? We bought 40 percent ownership rights in the Hungarian enterprise for $75 million, of which $48 million remains at the enterprise. Last year Chinoin achieved a profit worth 2.3 billion forints; we have not yet taken out our profit share but rather we turned it to development of the enterprise. If necessary we are inclined to invest more as well to strengthen the competitiveness of Chinoin.

FIGYELO: Istvan Bihari, director general of Chinoin, announced recently at an enterprise meeting that he was retiring. Although he has not yet spoken of the reasons for this our journal is informed that he decided on this step because of the difficulties of cooperation with the AVU. How will this affect the other owner?

Dehecq: The Chinoin management is leading the enterprise in a professional manner, which has aided and is aiding to a large degree the fact that the enterprise stayed on its feet in the period of the transformation of the Hungarian economy and the already mentioned loss of markets, and that we were able to find our common interests. I am certain that there is a management team at Chinoin which will be able to carry the enterprise forward after the retirement of Istvan Bihari. Of course Sanofi wants to give every aid for this from our European center and from our American enterprise, which is cooperating closely with Chinoin. I do not think that a change in personnel would endanger the independence of Chinoin and, as I already mentioned, our goal is to strengthen the activity of Chinoin—in research and in other important business activities.

FIGYELO: Foreign multinational firms founding an enterprise in Hungary or buying an ownership share in one are, from a number of viewpoints, dissatisfied with Hungarian industrial policy. Would Sanofi participate in an interest protection association created by the foreigners?

Dehecq: First of all we must cooperate with those who do research and development and manufacturing in Hungary, those who bring us closer to understanding the Hungarian market, to Hungarian culture, and help us understand it better. On the one hand because our products—medicines, cosmetic articles and foodstuffs—are human products and so can only be accepted this way. On the other hand, although France is in the majority ownership position, we want to operate a primarily Hungarian enterprise.

Riesenhuber in Russia To Discuss Science Cooperation

92WS0782A Duesseldorf HANDELSBLATT in German 10 Aug 92 p 5

[Article by bag: "German Support"]

[Text]

Research Cooperation/Riesenhuber in Moscow

The Federal Minister for Research and Technology, Heinz Riesenhuber (CDU), has been in Moscow since yesterday. He is sounding out the possibility of closer scientific cooperation with Russia. He wants to provide a total of 40 million German marks [DM] of support for science in the countries of the CIS this year and next. First, he wants to determine the quality of research in the various facilities, stated the minister before his departure.

Riesenhuber will visit Kiev next. The scientific-technical cooperation with Russia and the Ukraine is to be expanded to include the areas of laser technology and materials research. In addition to these areas, there is nanotechnology, which concerns units even smaller than

microtechnology, and marine biology. In Moscow, Riesenhuber is meeting with the Russian Science Minister Boris Saltykov, among others. From Moscow, Riesenhuber will travel to Petersburg and Kiev.

Central areas of German-Soviet cooperation until now were nuclear energy, space, agricultural science, and health research. These areas were based on an agreement concluded with Gorbachev in 1987.

Now, the former Soviet partners are prepared to open their previously heavily guarded military research facilities. This and the traditional Soviet-East German relationships opened numerous new possibilities. Although the conversion of armament plants to civilian production is the subject of heated discussion in Russia, no value is attached there to advice from the West.

Moscow even rejects a basic evaluation of the research agencies such as that in the new Federal Lands following unification. Riesenhuber believed he must restrict himself to providing information on German experiences. His urgent request to the Russians is, however, to support Germany in assessing the quality of the research facilities.

Netherlands To Fund Hungarian Research Institute

92WS0789A Zoetermeer SCIENCE POLICY IN THE NETHERLANDS in English Jul 92 pp 21-22

[Article: "The Netherlands To Participate in 'Collegium Budapest'"]

[Text] Education minister Ritzen is donating 300,000 guilders to a research institute that opened last year in Budapest. In exchange for this, Dutch researchers may carry out research at the institute. The objective of this 'centre of excellence' is to support scientific work in both East and West Europe, whilst encouraging scientists from Central and East Europe to stay in the region.

The 'Collegium Budapest' will offer prominent scientists, such as the world-famous economist Janos Kornai, and promising postgraduates an international and interdisciplinary environment in which to work. The setup is similar to other well-known institutes, such as Princeton, Stanford, Triangle Park, Berlin and Wassenaar (the Netherlands Institute for Advanced Studies, NIAS). The Collegium is the first Institute for Advance Studies in a former Eastern bloc country. The intention is for the institute to expand to become a European research centre.

The Dutch contribution is intended to reinforce the financial base of the new institute and to give Dutch researchers the opportunity to work in the central and eastern European region, where they will also be able to strengthen their ties with other western scientists. The 300,000 guilders is to be donated directly to the Collegium. A further 125,000 guilders is to be given to the NIAS to provide grants for high-quality research by central and eastern European scientists. In return for this, the Netherlands is to be given a place in the highest governing body of the institute. Professor D. J. van de Kaa, director of the NIAS, will hold this position, alongside such leading names as writer Gyorgy Konrad.

The continued existence of the Collegium has been assured for at least the coming five years by donations from private foundations and from the governments of the Netherlands, France, Austria, Switzerland, Germany, Hungary and, in the near future, Sweden. The scientists working at the institute are permitted to carry out independent research of their choice for 10 months. In addition, a number of specific research areas are specified on an annual basis, such as the transition from a planned to a market economy, the environment, migration flows, refugees and minorities.

In the autumn of 1992, the first 20 fellows will start working at the Collegium, of whom 10 will be scientists from Central and Eastern Europe.

UK Company Announces Digital Satellite Service From St. Petersburg

92WS0789B Chichester INTERNATIONAL TELECOMMUNICATIONS INTELLIG in English 27 Jul 92 p 3

[Article: "C&W Announces New Joint Venture in St. Petersburg"]

[Text] On July 15, Baltic Communications Limited (BCL), launched what it believes is the first fully digital direct satellite service from Russia's second largest city of St. Petersburg. The service is designed to meet the international telecommunications needs of business and the tourist industry.

Cable & Wireless is the largest single shareholder in BCL with a 40 percent stake. The other shareholders are San Francisco/Moscow Teleport Incorporated (SFMT) of California, United States and three of the main state telecommunications companies in St. Petersburg. C&W's initial investment in the company is US$5.5 million.

BCL has installed a digital overlay network linked to a Eutelsat earth station situated in the city. This facility relays calls to the Mercury Communications network in the United Kingdom which is used as the international transit centre for all customers, including major hotels, business centres and consulates.

C&W already has a number of joint ventures in Russia. It holds 50 percent stakes in Nakhodka Telecom and Sakhailn Telecom which were formed in November last year to build digital overlay networks in Nakhodka and Sakhailn, eastern Russia (See ITI Issues 315 & 335); is part of the Metropolitan Communications joint venture which is currently undertaking a survey on the modernisation, development and operation of long-distance and international telecommunications within the Tyumen

Oblast (see ITI Issue 337); and it has a minority stake in Sovam Teleport, a Moscow-based company providing a variety of enhanced telecoms services (see ITI Issue 343).

EC Assists Poland in Halting Scientific Brain Drain

92WS0789E Brussels XIII MAGAZINE (News Review supplement) in English No 3, 92 p 15

[Article: "Poland Provides Successful Testing Ground for EC Help to Scientists"]

[Text] There is widely shared and deep concern about the current serious situation of scientists and engineers in the central and eastern European countries and republics of the former Soviet Union.

In Poland, the nationwide brain-drain of experts—mainly to North America—threatens to devastate Polish training and research. The situation is particularly acute in information and communication technologies, where external demand for Polish experts is high. Immediate and concrete action is needed while the preparation of more far-reaching measures continues. In collaboration with the Committee for Scientific Research in Poland, a cooperative action has therefore been set up by DGXIII as a concrete pilot action to help sustain the human potential of research and development in the area of information and communication technology and to intensify contacts between researchers in Poland and in the Community. Three organizations have formed a consortium to provide help, administration and monitoring. They are the Polish Foundation of Science and the Polish Information Processing Society (PIP), both based in Warsaw, and the Gesellschaft fur Mathematik und Datenverarbeitung mbH (GMD) of St Augustin, Germany. Existing Polish IT and telecommunications research projects have been evaluated by a panel of experts comprising scientists from the Community and from Poland. Out of a total of 63 evaluated proposals, seven were selected as projects for support under the cooperative action, with funding of ECU300,000. During the negotiations of the proposal it became evident that special financial and administrative problems could arise during the execution of the project. Therefore a special, new and simple contract was developed by DGXIII in collaboration with DGXX to allow the Commission as well as the consortium to step in quickly should this become necessary.

The pilot phase has established that this model works successfully and the Polish side has already proposed a main phase model. Czechoslovakia and Romania are preparing proposals along the same lines.

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Finnish-Hungarian Telecommunications Agreements Outlined

Telcofund, Comptel

92WS0807A Maidenhead TELEFACTS in English Aug 92 pp 5, 6

[Article: "Hungary: Finnish Investor Enters Private Telco"]

[Text] Telcofund Ltd of Helsinki, which is owned 71 percent by Helsinki Telephone Company and 29 percent by a government-owned financing company (Finnfund, founded "to advance Finnish investment and transfer of knowhow in developing countries"), has signed a deal making the Finnish company an owner with 10 percent of the voting stock in EPT, a private telephone network venture based in Budapest.

EPT was established in February 1992 as a joint venture between the state-owned operator Matav (Hungarian Telecommunications Company Ltd), private enterprise Kontrax Telekom plc, the local borough councils, and "17,000 private individuals and businesses wishing to receive priority delivery of a new telephone line," according to Kontrax.

Hungarian Telcos Order Finnish Systems

Comptel Ltd of Helsinki is to supply turnkey systems to the private telephone companies founded by Kontrax and its partners in Hungary. Included in the deal is an order for an IBM AS/400 configuration, together with several application software packages, for EPT. Among the application modules is DEMS [Digital Exchange Management System] for three AXE switches which are to be delivered by Ericsson.

Comptel is owned jointly by Helsinki Telephone Company and Mutual Industrial Insurance Co. of Finland.

Nokia

92WS0807B Chichester INTERNATIONAL TELECOMMUNICATIONS INTELLIGENCE in English 24 Aug 92 pp 1, 3

[Article: "Hungary: Nokia To Supply Equipment for EPT Network"]

[Text] Nokia Telecommunications and Nokia Cables have signed an agreement to supply equipment for a telecommunications network being constructed in Budapest by Kontrax Telekom Rt (KT) of Hungary. The network will be operated by First Pest-City Telephone Company (EPT) Elso Pesti Telefontarsasag (Rt), in which KT is one of the major shareholders along with MATAV, the Hungarian PTT, and Helsinki Telephone Company (HTC).

Under the agreement, Nokia Telecommunications and Nokia Cables will supply optical and copper cable, related optical terminal and multiplexer equipment and

a transmission network management system. Nokia puts the value of the contract in its initial phase in excess of FIM20 million.

Besides delivery of equipment, Nokia will have system responsibility for the functioning of its equipment, including project management and supervision of installation as well as for training of operating and maintenance personnel. Project implementation will begin this Autumn and will be completed by May 1993.

Nokia says the contract represents a further step in penetrating the Hungarian telecommunications market and follows contracts awarded earlier this year for the supply of cellular network base stations to WesTel, the joint-venture between the Hungarian Telecommunications company and US West, for its cellular network.